JUMPING PLANT LICE OF THE TRIBE CIRIACREMINI (HOMOPTERA : PSYLLOIDEA) IN THE ETHIOPIAN REGION

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CONTENTS

SYNOPSIS

An historical account of the taxonomy and nomenclature of the group called here the tribe Ciriacremini is given. The tribe Ciriacremini is redefined, its internal phylogeny briefly discussed and a key is given to the five genera included. In the Ethiopian region 30 species in three genera are recognized and keys are given to all these taxa. One genus and 21 species are described as new and the remaining taxa are redefined. Three new generic synonyms and three new combinations are proposed, and four species are replaced in their original combinations.

INTRODUCTION

The psyllid faunas of the tropics, subtropics and the south temperate region are poorly known and that of the African continent is no exception. Currently 92 described species are known from Africa, south of the Sahara, but recent collecting in the region would suggest that this figure represents only a small proportion of the existing fauna. For example, prior to the author's recent field trip to East Africa, nine described species of Psylloidea had been recorded in the literature from the area, yet on this visit approximately 90 species were collected and most of these appear to be undescribed.

Psylloidea can transmit plant viruses, are pests of fruit, ornamental and timber trees, and one species is known to have developed resistance to several insecticides (McMullen & Jong, 1971). Research on the systematics of the group is of increasing interest to foresters and economic entomologists and the need for some alpha-taxonomic studies on tropical faunas is abundantly clear. Some such work was begun by Karel Vondracek in the last decade shortly before his death. Capener (1968; 1970*a*; 1970*b*; 1973) produced some useful work on the South African fauna but he has now retired leaving a large collection of unworked material.

About 15% of the material recently collected from Africa consists of specimens in which the fore wing bears a clearly developed *rm* crossvein, suggesting they are related to Enderlein's genus *Ciriacremum*. As much of this material represents undescribed taxa, a taxonomic study of the African Ciriacremini is given below. Prior to this work the group was thought to be a tribe in the subfamily Psyllinae containing, worldwide, five monobasic genera, a genus with four species and a genus with two species. The current work, based on a study of over 2,250 specimens, agrees with the systematic position of the group but rearranges the Ethiopian constituents into one new monobasic genus, a genus with six species, two of which are new, and a genus with 23 species, 18 of which are new. The New World component of the group, three species in three genera, is not considered here to any depth because only five specimens were available for study.

HISTORICAL

Enderlein (1910*b*) first used the name Ciriacreminae as a replacement name for Prionocnemidae Scott, 1882, pointing out that Scott's name was invalid as it was not derived from a generic name in the group to which it was applied. Scott included two genera, *Carsidara* and *Tyora*, in his group, and Prionocnemidae was used in various derivations by Löw (1886), Froggatt (1901), Kieffer (1906) and Kuwayama (1907). None of these authors widened the scope of the group. Kieffer (loc. cit.) erected the subfamily Phacoseminae for two genera *Phacosema* and *Phacopteron*, and Kuwayama (loc. cit.) placed the genus *Anomoneura* into the Phacoseminae. Enderlein considered this group to be a tribe in the Ciriacreminae.

Enderlein's principal character defining the Ciriacreminae is the presence of an *rm* crossvein between the radial sector (*Rs*) and the upper branch of the medial vein (M_{1+2}) or the punctiform contact between *Rs* and M_{1+2}. He divided the subfamily into two tribes, the Ciriacremini and the Phacosemini, on the presence or absence of a basal spine on the hind tibia. In the former tribe he placed the genera *Ciriacremum, Panisopelma, Tyora, Carsidara* and *Udamostigma*, and in the latter tribe he placed *Phacosema* and *Phacopteron*. These two latter genera were tentatively synonymized by Crawford (1912) and Laing (1930) confirmed the synonymy. Aulmann (1912*b*) added *Kleiniella* to the Ciriacremini and, in his psyllid catalogue (Aulmann, 1913), included the following genera in the Ciriacreminae: *Carsidara, Kleiniella, Tyora, Geyerolyma, Panisopelma, Ciriacremum, Phacosema, Phacopteron, Anomoneura, Udamostigma* and *Nesiope*. Šulc (1914) erected

Connectopelma as a subgenus of *Panisopelma* and Enderlein (1927) further added the genus *Desmiostigma* to the group.

Crawford (1911) seems to have partly misunderstood Enderlein's work for, although agreeing that Prionocnemidae Scott was an invalid name, he also rejected Ciriacreminae Enderlein for a spurious nomenclatural reason. However, he quite rightly pointed out that Enderlein's subfamily was a rather heterogeneous mixture of unrelated genera and went on to define a subfamily, the Carsidarinae, containing the following genera: *Carsidara, Tyora, Mesohomotoma, Tenaphalara, Macrohomotoma, Epicarsa, Freysuila, Homotoma, Bactericera* and *Rhinopsylla*. Later (Crawford, 1914) he partially accepted Enderlein's subfamily, using the name 'Ceriacreminae' for two New World species. Also in that paper Crawford suggested the 'Ceriacreminae' were probably most closely related to the Psyllinae.

Heslop-Harrison (1958), in his reorganization of the classification of the Psylloidea, went to considerable lengths to sort out the nomenclatural complications revolving around the Ciriacreminae but then proceeded to introduce several taxonomic complications. He used the Ciriacreminae in a very broad sense to include the old Ciriacreminae of Enderlein and the Carsidarinae of Crawford, and many other groups of genera in what amounted to a ragbag subfamily for those genera he could not place in the other subfamilies, i.e. Liviinae, Aphalarinae, Psyllinae, Spondyliaspinae and Triozinae. He split the subfamily into seven tribes including the Ciriacremini and Carsidarini. In the former tribe he placed the genera *Ciriacremum, Bunoparia, Kleiniella, Panisopelma, Connectopelma* and *Anomalopsylla*. At no point in this paper did Heslop-Harrison clearly define the Ciriacreminae but in the key to tribes the Ciriacremini were stated to have '. . . venation not triozine, antennae long and slender. Fore wing with a distinct tracheate *rm* crossvein or with *Rs* and M_{1+2} closely approximating. Head not cleft in front'. In a later paper (Heslop-Harrison, 1960) he mentions that members of both the Carsidarini and the Ciriacremini have a bipartite male proctiger, secondary terminal epiphyses ('Sternalzapfen' of Enderlein, 'Hypovalves' auctt.) in the male, and an *rm* crossvein or with *Rs* and M_{1+2} closely approximating. He distinguished the latter group by the non-cleft head, the 'usual' development of genae and the 'normal' insertion of the antennae.

Vondracek (1957) in his figure 52 obviously considered the Ciriacreminae in a more restricted sense, possibly that of Crawford, and placed the group close to the Psyllinae and Arytaininae. Later (Vondracek, 1963) he described the monobasic African genus *Syndesmophlebia*, placed it in the Ciriacreminae and differentiated it from *Ciriacremum, Anomoneura, Bunoparia, Panisopelma* and *Connectopelma*. Also in that paper (Vondracek, loc. cit.) he erected the tribe Anomalopsyllini within the Spondyliaspinae for the Australian genus *Anomalopsylla*. Klimaszewski (1963) erected a separate tribe Anomoneurini for the Asian genus *Anomoneura* because of the multiple branching of *Rs* in the fore wing of the two known species. Both Klimaszewski (1964) and Bekker-Migdisova (1973) in their classifications of the Psylloidea placed the Ciriacreminae in the family Psyllidae. The latter author separates the group from other members of the family Psyllidae on the presence of an *rm* crossvein or contact between *Rs* and M_{1+2}, a bipartite male proctiger

and the presence, in some species, of rudimentary genal cones. She further separates the group into two tribes, the Ciriacremini and the Anomoneurini, and distinguishes the former by the absence of a pectinate *Rs* and the presence of more or less developed hypovalves on the male subgenital plate.

MATERIAL, METHODS AND TERMINOLOGY

Most of the material studied in this work was collected in the last twenty years by a number of field entomologists working in various parts of Africa. Principals among these are Drs José Passos de Carvalho and Tony van Harten in Angola, Laurie Capener in South Africa, Professor J. T. Medler in Nigeria, Dr V. F. Eastop in West and East Africa, and the present author in South-western, Central and East Africa. The bulk of this material is now incorporated into the collections of the British Museum (Natural History). The collections of the Central African Museum, Tervuren, and the National Collection of Insects, Pretoria, provided valuable additional material.

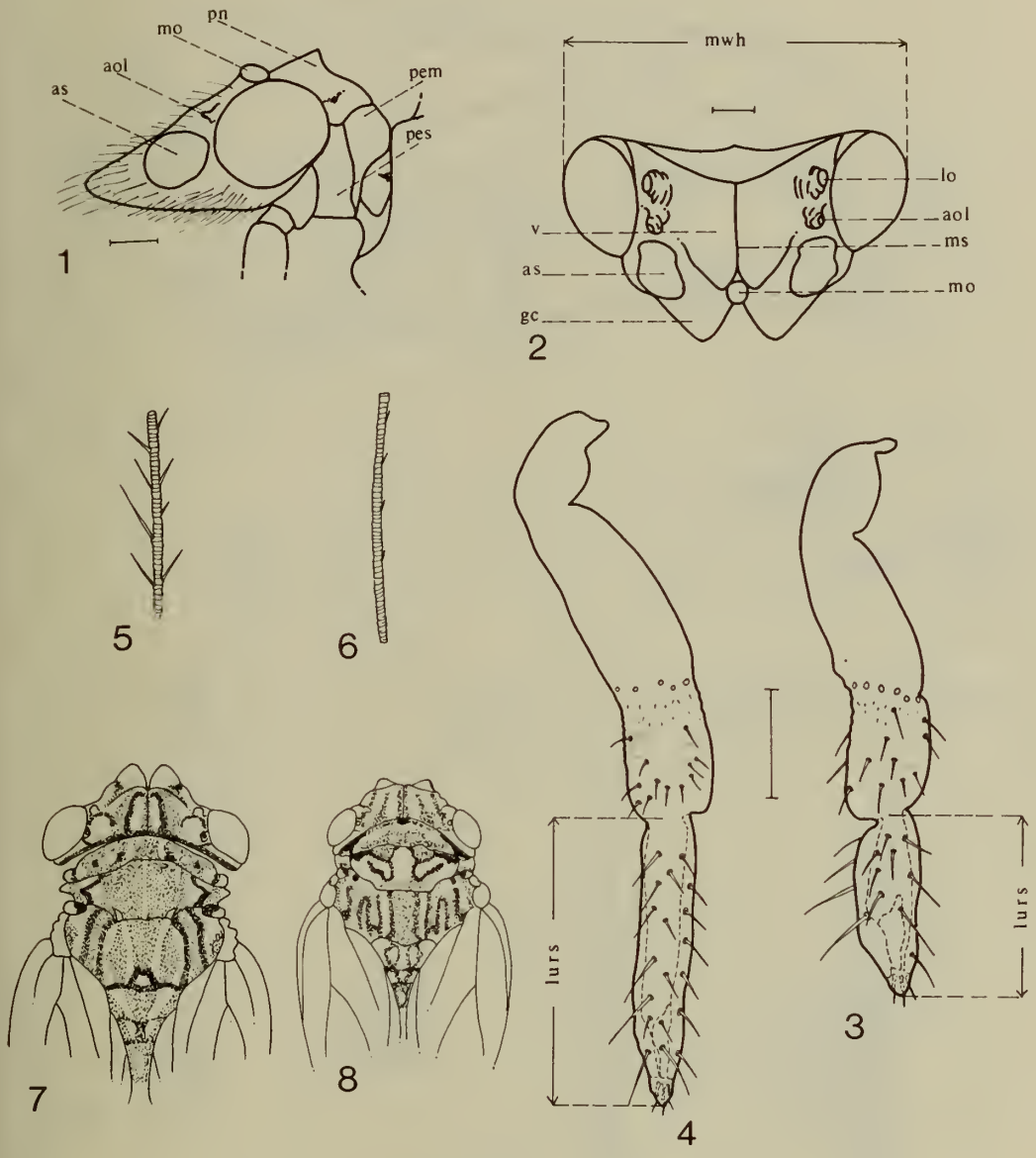
Type-depositories are given in the text below in abbreviated form as follows.

MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin.
SAM, Cape Town	South African Museum, Cape Town.
IPK, Eberswalde	Institut für Pflanzenschutzforschung Kleinmachnof, Eberswalde.
ZI, Leningrad	Zoological Institute, Academy of Sciences of USSR, Leningrad.
BMNH, London	British Museum (Natural History), London.
NCI, Pretoria	[National Collection of Insects] Plant Protection Research Institute, Pretoria.
NM, Nairobi	National Museum, Nairobi.
NR, Stockholm	Naturhistoriska Riksmuseum, Stockholm.
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren.
IZPAN, Warsaw	Instytut Zoologiczny, Polska Akademia Nauk, Warsaw.
USNM, Washington	National Museum of Natural History, Washington.

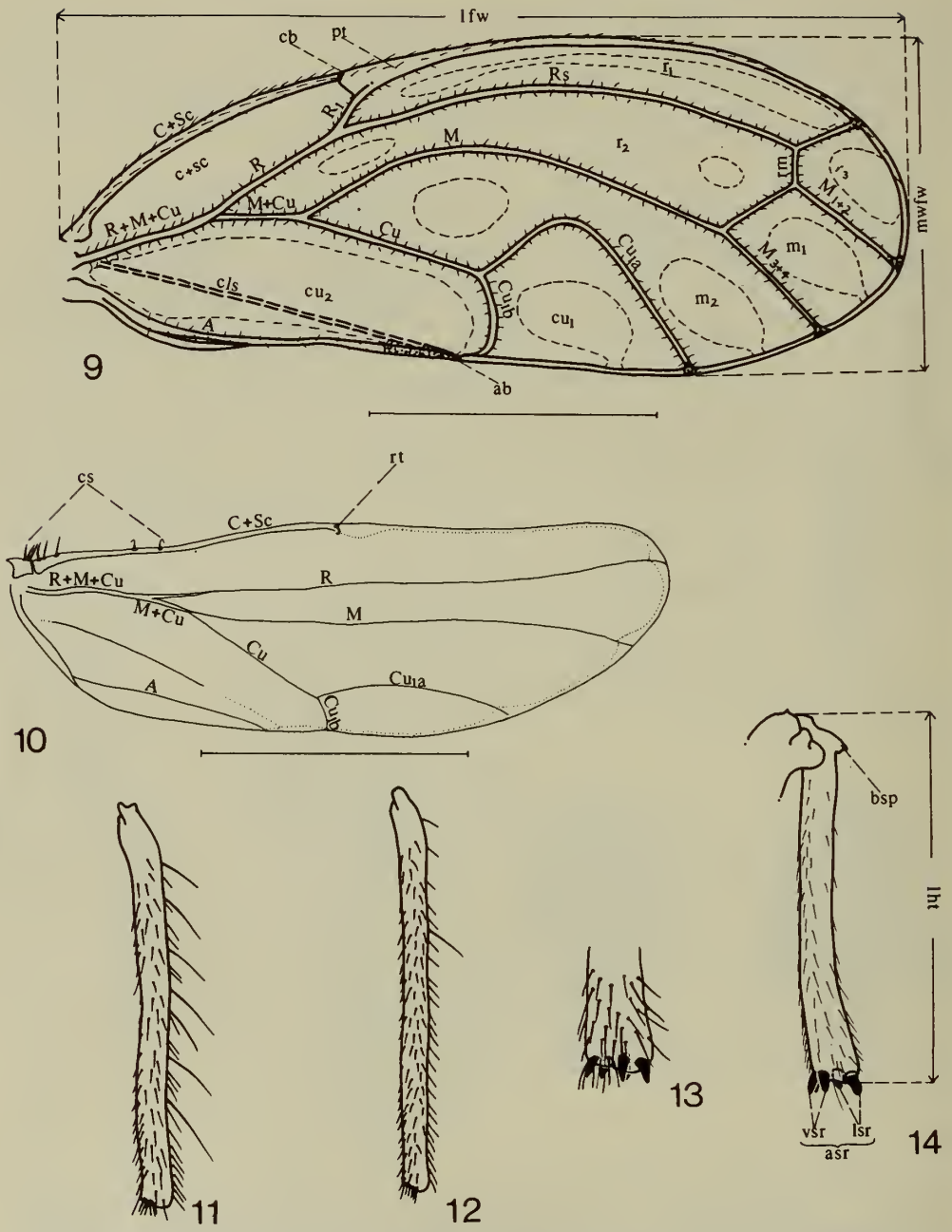
The material is stored dry (on card points or micropins), in 80% ethanol, or as permanent microscopical preparations on glass slides in a modified Berlese mountant. It was found necessary to make these preparations in order to study antennal structure, wing chaetotaxy and genital structures.

All measurements quoted below were made from slide mounted material. The reference points within which measurements were taken of the various structures are shown in Text-figs 2–4, 9, 14 and 19.

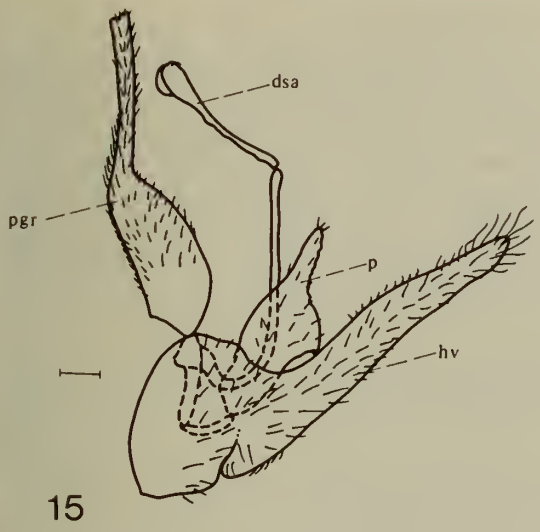
Structural terminology (Text-figs 1–19) used follows that of Vondracek (1957) and Dobreanu & Manolache (1962). One point where I differ from previous authors, e.g. Crawford and Vondracek, is in the use of the terms 'spur' and 'spine', particularly in relation to the hind tibia. In this paper the term 'spine' is used for a prolongation of the cuticle which does not have an articulated base (Text-fig. 14), and 'spur' is used for a structure with an articulated base and is a derived seta (Text-figs 13, 14). Thus the structure at the base of the hind tibia is called a spine and those at the apex are spurs, exactly the opposite to the previous nomenclature of these structures in Psylloidea.



FIGS 1–8. Ciriacremini species, morphological features. *Palmapenna hymenostegioides*, 1, head and prothorax, lateral view. *Ciriacremum bicaudatum*, 2, head, dorsal view; 6, seventh antennal segment; 7, head and thorax, dorsal view. *Kleiniella jassina*, 3, rostrum; 5, seventh antennal segment. *C. filiverpatum*, 4, rostrum. *C. africanum*, 8, head and thorax, dorsal view. (aol – anteoccipital lobe; as – antennal socket; gc – genal cone; lo – lateral ocellus; lurs – length of ultimate rostral segment; mo – median ocellus; ms – median suture; mwh – maximum width of head; pem – proepimeron; pes – proepisternum; pn – pronotum; v – vertex.) Scale line represents 0·1 mm.



FIGS 9–14. Ciriacremini species, morphological features. *Ciriacremum bicaudatum*, 9, fore wing; 10, hind wing; 14, hind tibia. *Kleiniella jassina*, 11, fore tibia. *C. pervatum*, 12, fore tibia. *K. superba*, 13, apex of hind tibia. (*A* – anal vein; ab – anal break; asr – apical spurs; bsp – basal spine; *C* – costa; *c* – costal cell; cb – costal break; *cls* – claval suture; cs – costal setae; *Cu* – cubital vein; Cu_{1a} – first cubital branch; Cu_{1b} – second cubital branch; cu_1 – first cubital cell; cu_2 – second cubital cell; lfw – length of fore wing; lht – length of hind tibia; lsr – lateral spurs; *M* – medial vein; M_{1+2} – combined first and second medial branch; M_{3+4} – combined third and fourth medial branch; m_1 – first medial cell; m_2 – second medial cell; mwfw – maximum width of fore wing; *R* – radial vein; R_1 – first radial vein; *Rs* – radial sector; r_1, r_2, r_3 – first, second and third radial cells; *rm* – radio-medial cross-vein; rt – retinaculum; vsr – ventral spurs;



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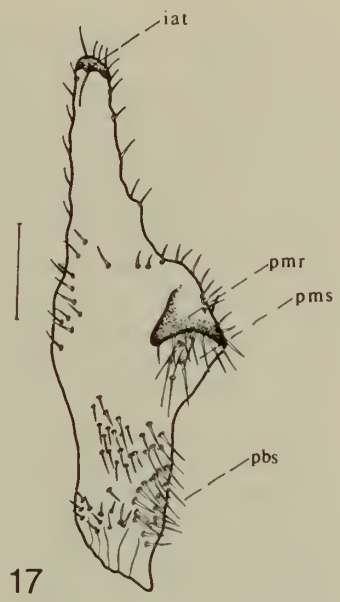

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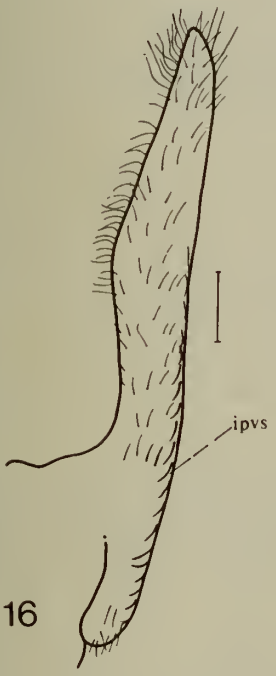

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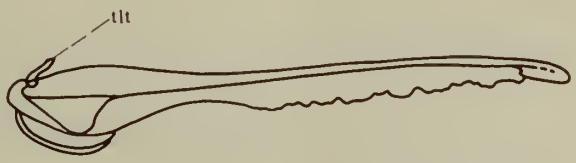

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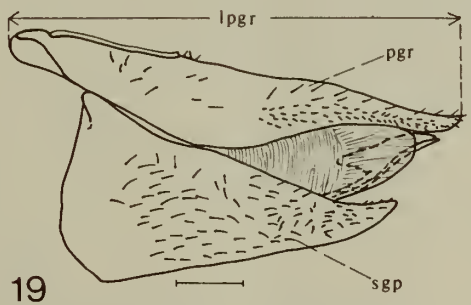

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FIGS 15–19. *Ciriacremum* species, morphological features. *C. bicaudatum*, 15, male genitalia, lateral view; 16, male hypovalve, lateral view of inner surface; 17, male paramere, lateral view of inner surface; 18, distal segment of aedeagus. *C. africanum*, 19, ovipositor, lateral view. (dsa – distal segment of aedeagus; hv – hypovalve; iat – inner apical tooth; ipvs – inner postero-vertical setae; lpgr – length of proctiger; p – paramere; pbs – postero-basal setae; pgr – proctiger; pmr – postero-medial ridge; pms – postero-medial setae; sgp – subgenital plate; tlt – terminal tube.) Scale line represents 0·1 mm.

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TAXONOMIC TREATMENT

Tribe **CIRIACREMINI**

Ciriacremini Enderlein, 1910*b* : 137, partim. Type-genus: *Ciriacremum* Enderlein.
Ciriacreminae Enderlein; Aulmann, 1913 : 79, partim.
Ceriacreminae Enderlein; Crawford, 1914 : 62.
Ciriacremini Enderlein; Heslop-Harrison, 1958 : 563, partim.
Ciriacremini Enderlein; Vondracek, 1963 : 273.
Ciriacremini Enderlein; Bekker-Migdisova, 1973 : 111.

Small to large size, head width 0·52–1·46 mm. Body robust or somewhat elongate. Head as broad as thorax and distinctly separated from thorax, in profile slightly depressed from axis of body; vertex wider than long with complete median suture, mostly clearly demarked from genae by transverse sutures, anteoccipital lobes mostly present; genae covering frons dorsally and either slightly bulbous or developed into cones. Antenna filiform to elongate filiform, rhinaria only present on segments four, six, eight and nine.

Thorax convex from above, arched in profile, pronotum mostly narrower than head; propleurites mostly subequal and both touching pronotum dorsally. Fore wing parallelogrammatic or ellipsoid; costal and anal breaks present, pterostigma mostly present, *rm* crossvein present or there is punctiform contact between *Rs* and M_{1+2}, *M* and *Cu* with common stem. Hind coxa with clearly developed meracanthus, hind tibia mostly with a well developed basal spine, hind basitarsus with a pair of apical spurs.

Male proctiger shaped to give broad basal part and narrow apical part which may be long or short, subgenital plate often with a pair of apical appendages (hypovalves).

Female proctiger and subgenital plate subconical, sometimes elongate, former often longer than latter.

Distribution, host plants and biology. The bulk of the known species are restricted to the Ethiopian region but three species apparently belonging to the tribe are recorded from Central and South America.

Much of the material studied was collected at light and only four species are known from larval stages as well as adults. Of the 30 known species in the Ethiopian region only nine have any recorded host data but these species were all found on trees of the leguminous family Caesalpiniaceae. There are no host records for the six species placed in the genus *Kleiniella* but all are known from both lowland and montane forest regions of Africa (Map 2). *Ciriacremum* species seem to have successfully exploited both forest and woodland areas, their typical habitat being the *Brachystegia* woodland zone in Central Africa (Maps 3–7). Recorded host genera for *Ciriacremum* are: *Brachystegia*, *Hymenostegia*, *Cynometra*, *Cassia*, *Julbernardia* and *Schotia* and the distribution of these genera in Africa is summarized in Map 1.

From personal observations it seems that only a few species of Psylloidea are attracted to light and their response to artificial light sources seems to vary considerably with their state of maturation. However, members of the Ciriacremini are frequently caught in light traps and Dr Passos de Carvalho, working in Angola, informs me in a personal communication 'I never saw so many Psyllidae attracted to light; here in Nova Lisboa thousands of these examples (*Ciriacremum*) came through my bathroom window and the bottom of the bath tub was almost covered with them'.

Table 1 is a summary of the numbers of specimens of six apparently sympatric species occurring in Central Africa in *Brachystegia* woodland. The material was collected in a variety of ways; on host plants, as vagrants, by yellow trays and light traps. From this table one can see the main period of adult activity takes place between August and December, roughly coincidental with the end of the dry season and the onset of the rains, with adults and larvae found on host plants between September and March. Although these data are very incomplete and the sampling not at all random it does suggest that *Ciriacremum* species in Central Africa have only one generation per year with a dry season diapause probably in a larval stage. It is of interest to note that from over 250 microscopical preparations of females, eggs were found in only five specimens.

The known larvae (Text-figs 24–27) are of the psylloid type, free living on the leaves and shoots of their host plants. They do not produce wax filaments and have little apparent affect on their hosts. Larvae of *Ciriacremum harteni* sp. n., occurring in large numbers on regenerating *Brachystegia tamarindoides*, were causing some leaf atrophy on young shoots.

Discussion. As mentioned earlier (p. 5) Bekker-Migdisova suggests that the Ciriacremini is the sister group of the Anomoneurini, a tribe with two species occurring in the Oriental region and probably developing on trees of the family Moraceae. As I have no evidence to the contrary this suggested phylogeny within the Ciriacreminae is accepted here but with reservations. The presence of an *rm* crossvein or the punctiform contact of *Rs* and M_{1+2} is considered here to be a derived feature in the modern Psylloidea and has developed independently several

TABLE 1

Summary of biological data and numbers of specimens examined of six sympatric species of *Ciriacremum* in Central Africa (Zaire to Rhodesia).

SPECIES	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
filiverpatum on *Brachystegia* sp.					0♂, 1♀; lt	0♂, 2♀; lt		47♂, 63♀; lt	0♂, 1♀; lt 1♂, 2♀; yt	38♂, 48♀; lt	85♂, 7♀; lt 0♂, 2♀; lt (with eggs) 6♂, 8♀; oh (with eggs)	0♂, 1♀; lt
bicaudatum ? host								1♂, 0♀; lt	3♂, 0♀; lt 0♂, 2♀; yt	11♂, 11♀; lt	3♂, 2♀; lt	10♂, 16♀; lt
julbernardioides on *Julbernardia* spp.	6♂, 6♀, n; oh 3♂, 1♀; yt	13♂, 8♀; v	5♂, 2♀; v						3♂, 5♀, n; oh 1♂, 0♀; yt	3♂, 1♀, n; oh 36♂, 51♀; lt 1♂, 0♀; yt 1♂, 3♀; v	3♂, 3♀; yt	
africanum on *Cassia* sp.								5♂, 0♀; lt	18♂, 14♀; oh 14♂, 11♀; lt 4♂, 11♀; yt 1♂, 0♀; v	16♂, 38♀; lt 5♂, 0♀; yt 5♂, 14♀; v	18♂, 31♀; lt	
megafricanum ? host			0♂, 1♀; v					23♂, 44♀; lt 0♂, 1♀; yt	2♂, 0♀; yt 1♂, 2♀; v	24♂, 24♀; lt	47♂, 62♀; lt	
harteni on *Brachystegia* spp.		8♂, 6♀, n; oh	21♂, 15♀; oh (1♀ with eggs)			0♂, 1♀; yt		4♂, 14♀; oh	10♂, 14♀; yt	4♂, 2♀, n; oh 5♂, 5♀; yt		
Rainfall (mm)	118	117	115	90	35	3	0	20	52	65	88	127

Mean monthly rainfall figures for the whole area are given in base horizontal row.
lt = light trap, n = larva, oh = on host, v = vagrant, yt = yellow tray. For further explanation see text (p. 11).

times in the evolutionary history of the group. In the genera *Phacopteron* and *Pseudophacopteron* *Rs* and M_{1+2} make punctiform contact but on the structure of the head and thorax these genera are naturally placed near the Pauropsyllini in the Carsidaridae (Loginova, 1972). Also several other genera in the Carsidaridae, e.g. *Carsidara* and *Mesohomotoma*, possess an *rm* crossvein but in these genera it is of a different nature to that found in the Ciriacreminae. An *rm* crossvein is present in the New Zealand genus *Anomalopsylla* which is currently placed in the Spondyliaspinae (Vondracek, 1963). These examples are all from outside the family Psyllidae. Where the *rm* crossvein occurs within the Psyllidae its presence is used here to indicate monophyly and all species possessing this feature are placed in the Ciriacreminae. This usage must remain speculative until the functional significance of the presence of an *rm* crossvein is understood and other corroborative synapomorphic characters are found. Other authors (Klimaszewski, 1963; Bekker-Migdisova, 1973) use the apparently bipartite male proctiger to diagnose the group further but the latter author considers this feature to be primitive. If this is the case then it should not be given much weight when considering phylogeny.

In most Ciriacremini the male proctiger is subdivided into a broader basal part, which sometimes bears lateral lobes or expansions, and a narrower apical part which is often relatively long. It is not clearly bisegmented, as in *Phytolyma* or *Mesohomotoma*, and may not be a primitive feature. This kind of proctiger structure occurs widely in the Psylloidea but is not often as clearly developed as in the Ciriacremini.

Apart from the Ethiopian species, which are considered here, three other species are currently placed in the Ciriacremini and are distributed in the New World. *Panisopelma quadrigibbiceps* Enderlein, 1910*a*, was described from east-central Argentina, *P.* (*Connectopelma*) *conifrons* Sulc, 1914, from the other side of the Andes in central Chile, and *Ceriacremum setosum* Crawford, 1914, from Central America. In *Panisopelma* and *Connectopelma* the anteoccipital lobes are absent but the vertex, on either side of the median suture, is swollen to form a pair of lobes or humps, the basal spine of the hind tibia is very weak or absent and the male subgenital plate lacks hypovalves. If these two species share a common ancestry with the Ethiopian Ciriacremini, and this is open to doubt, their divergence from the Old World forms was early in the history of the group. The third New World species, *Ceriacremum setosum*, more closely resembles the Old World forms; the anteoccipital lobes are present and the vertex is unmodified, the basal spine of the hind tibia is strongly developed and the form of the male proctiger is similar to that of *Kleiniella medleri* sp. n. and *Ciriacremum capense* Enderlein.

Key to genera of Ciriacremini

1 Vertex on either side of median suture swollen to form two clearly protruding lobes or humps (Text-fig. 28), anteoccipital lobes absent; basal spine of hind tibia very weak or absent. South America. ***PANISOPELMA*** and ***CONNECTOPELMA***

– Vertex not or hardly swollen on either side of median suture, anteoccipital lobes present (Text-figs 29–33); basal spine of hind tibia well developed. Ethiopian Region, Central America 2

2 Fore wing without a pterostigma, *Cu* curves forwards to touch *M* (Text-fig. 59) ***PALMAPENNA*** (p. 14)

– Fore wing with a pterostigma, *Cu* not touching *M* (Text-figs 51–56) . . . 3

3 Veins of fore wing with hairs which are more than twice as long as width of veins (Text-figs 51–58); hairs on antennal flagellar segments longer than width of pedicel (Text-fig. 5); fore wing usually patterned (Text-figs 51–58), pterostigma usually sessile but if pedunculate then wings clearly pigmented (Text-figs 57–58); male subgenital plate without hypovalves (Text-figs 96, 102, 108) ***KLEINIELLA*** (p. 15)

– Hairs on veins of fore wing usually short (Text-fig. 60), rarely longer than width of veins; hairs on antennal flagellar segments not longer than width of pedical (Text-fig. 6); fore wing usually hyaline (Text-fig. 61), pterostigma usually pedunculate (Text-fig. 62) but if sessile then wing hyaline; male subgenital plate usually with hypovalves (Text-figs 114, 126, 138) . . ***CIRIACREMUM*** (p. 24)

PALMAPENNA gen. n.

Type-species: *Palmapenna hymenostegioides* sp. n.

Description. Medium size, head width 0·64–0·78 mm. Integument shiny, with a moderately dense covering of long hairs. Head wider than pronotum, with vertex and genal cones in same plane as axis of body; vertex almost flat; genal cones not distinctly separated from vertex, completely covering frons dorsally; antenna filiform, flagellum two to two and a half times longer than maximum width of head, sparsely covered with short hairs; ultimate rostral segment slightly shorter than third antennal segment. Thorax, in profile, weakly convex, mesoscutellum raised medially into a blunt tubercle; propleurites subequal, both in contact with pronotum dorsally (Text-fig. 1). Fore wing rounded triangular, broadest distally; pterostigma absent, costal and anal breaks present, veins sparsely covered with long hairs on dorsal surface; *rm* crossvein present, long, *M* stem also in contact with *Rs* proximally and with Cu_1 distally, points where veins make contact or branch often marked by a sharp callus dorsally; costal setae of hind wing divided into two groups. Fore femur with a few longer setae antero-ventrally, fore tibia with four to five pairs of longer setae antero-dorsally; apical spurs of hind tibia not arranged to form a distinct ventral group.

Male subgenital plate without hypovalves; proctiger with short, narrow apical part and broad basal part which bears a pair of backwardly pointing lateral lobes.

Ovipositor short, simple, conical.

Discussion. The form of the fore wing in this genus is highly derived and it is very difficult to assess its ancestral type. The pterostigma is completely lacking, *M* curves in an unusual manner to make contact with both *Rs* and Cu_1, and the overall wing shape is unique among known psyllids. However, the *rm* crossvein is present and well developed and the veins bear long hairs similar to species of *Kleiniella*. The genal cones are not completely separated from the vertex by the transverse sutures but in most other respects *Palmapenna* resembles other members of the Ciriacremini and the genus is provisionally placed in this tribe.

Palmapenna hymenostegioides sp. n.

(Text-figs 1, 29, 59, 89, 93–95, 183, 184)

Description. *Colouration.* Overall body colour brown with ochraceous and orange mottling. Head ochraceous above, brown below; antenna with scape and pedicel brown, segments three to nine ochraceous with darkened tips, segment ten brown; dorsum of thorax with broad longitudinal ochraceous band, mesoscutellum brown antero-medially, pro- and

mesopleurae brown, metapleurites ochraceous-green; fore wing hyaline with heavy brown pattern in distal third and in posterior half giving wing a paddle-like appearance (Text-fig. 59), veins alternately ochraceous and brown; fore leg brown with ochraceous mottling, middle and hind legs ochraceous with orange mottling; abdomen dark brown above, mottled ochraceous-orange ventrally.

Structure. ♂. Head about one and a half times longer than wide, sparsely haired dorsally, densely haired ventrally; post-orbital ridges absent, anteoccipital lobes reduced to small tubercles; genal cones well developed (Text-fig. 29), conical; antenna moderately long, flagellum 2·08–2·28 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·3 : 1·4 : 1·7 : 2·2 : 2·4 : 1·6 : 0·8; ultimate rostral segment 0·85–0·96 times as long as third antennal segment. Pronotum short, narrower than maximum width of head; propleural suture diagonal, episternum narrow above (Text-fig. 1), epimeron narrow below; fore wing venation and spinule arrangement as in Text-fig. 59; hind tibia with four or five spurs apically not arranged to form a ventral group. Proctiger (Text-fig. 93) with very short and narrow apical part, basal part broad with a pair of backwardly directed lateral expansions; paramere (Text-figs 93, 94) elongate conical, slightly longer than proctiger, inner surface evenly and densely covered with short curved setae and with a short thick spine postero-medially; subgenital plate (Text-fig. 93) without hypovalves.

♀. Antennal flagellum 2·10–2·43 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·4 : 1·3 : 1·6 : 2·1 : 2·3 : 1·5 : 0·7; ultimate rostral segment 0·81–0·93 times as long as third antennal segment. Ovipositor (Text-fig. 183) short, proctiger 0·69–0·75 times as long as hind tibia.

Measurements (±0·01 mm, based on 5 ♂ and 7 ♀). Maximum width of head, ♂ 0·64–0·72, ♀ 0·63–0·78; length of ultimate rostral segment, ♂ 0·11, ♀ 0·11–0·13; length of antennal flagellum, ♂ 1·46–1·51, ♀ 1·46–1·71; length of fore wing, ♂ 2·00–2·22, ♀ 2·16–2·50; length of hind tibia, ♂ 0·69–0·80, ♀ 0·71–0·85; length of ♀ proctiger, 0·52–0·61.

Host plant. *Hymenostegia laxiflora* (Bentham) Harms. A long series of adults was collected from a group of young seedlings of the host plant in an old coffee forest that was reverting to its natural state.

Holotype ♂, Angola: Salazar, I.I.A.A., 9–15.iii.1972, beaten from *Hymenostegia laxiflora* (*BM Southern Africa Expedition*) (BMNH, London), dry mounted.

Paratypes. Angola: 125 ♂, 154 ♀, same data as holotype; dry and slide mounted, in 80% ethanol; deposited in BMNH, London; MNHU, Berlin; MRAC, Tervuren; USNM, Washington; ZI, Leningrad.

KLEINIELLA Aulmann, 1912

Kleiniella Aulmann, 1912*b* : 100. Type-species: *Kleiniella superba* Aulmann, by monotypy.
Desmiostigma Enderlein, 1927 : 240. Type-species: *Desmiostigma jassina* Enderlein, by monotypy. **Syn. n.**
Syndesmophlebia Vondracek, 1963 : 272. Type-species: *Syndesmophlebia oblongata* Vondracek, by monotypy. **Syn. n.**

Description. Large to medium size, head width 0·79–1·46 mm. Integument matt with a sparse covering of long hairs. Head as wide as or wider than pronotum and slightly depressed from axis of body; each lateral half of vertex with a median concavity; genal cones poorly or well developed, distinctly separated from vertex by transverse sutures; anteoccipital lobes present; antenna filiform, 2·0–4·5 times longer than width of head, flagellar segments bearing long hairs; ultimate rostral segment short, 0·25–0·89 times as long as third antennal segment and 1·2–1·8 times longer than tenth antennal segment. Thorax, in profile, convex; propleurites usually subequal and both in contact with pronotum dorsally. Fore wing parallelogrammatic or ellipsoid, normally hyaline with a clearly developed brown pattern, rarely uniformly

brown; pterostigma sessile or pedunculate; veins bearing long hairs on dorsal surface, at least in proximal half of wing; costal and anal breaks present; *Rs* in punctiform contact with M_{1+2} or there is a short *rm* crossvein; costal setae of hind wing tending not to be arranged into groups. Fore femur with a few longer setae antero-ventrally, fore tibia with four to six pairs of longer setae dorsally; hind tibia with apical spurs usually arranged evenly around apex, rarely grouped to form a ventral comb. Male subgenital plate without hypovalves; proctiger with broad basal part and short, narrow apical part. Female ovipositor conical, proctiger 0·81–1·80 times longer than hind tibia.

Host plants. Unknown.

Distribution. Congo basin and montane forest regions of tropical Africa from Tanzania to Sierra Leone (Map 2).

Discussion. It is suggested here that the genus *Kleiniella* contains the following six species: *K. superba* Aulmann, *Desmiostigma jassina* Enderlein, *K. congoensis* sp. n., *Phacosema guineensis* Aulmann, *Syndesmophlebia oblongata* Vondracek and *K. medleri* sp. n.

According to Enderlein (1927) *D. jassina* differs from *K. superba* because of its smaller genal cones, the absence of hairs on the veins of the fore wing and the overall shape of the fore wing. In fact the wing veins in *jassina* do bear a double row of hairs on the dorsal surface and, in the proximal half of the wing, these hairs are long and similar to those found in *superba*. The wing shape in *jassina* is more like the parallelogrammatic wing of *superba* than the ellipsoid wing of *S. oblongata* and *K. medleri*. On this basis *Desmiostigma* is synonymized with *Kleiniella*.

K. guineensis (Aulmann), originally placed in the genus *Phacosema* but more naturally placed here, has an intermediate pterostigma condition for the genus. In *oblongata* and *medleri* the pterostigma is triangular and pedunculate, in *guineensis* it is triangular and sessile, and in *superba, jassina* and *congoensis* it is trapezoid and sessile.

The synonymy of *Syndesmophlebia* with *Kleiniella* is more difficult to accept. Together with *medleri, oblongata* is rather intermediate between *Kleiniella* and *Ciriacremum*. The wing veins, antennal segments, body and legs bear long hairs, the *rm* crossvein is punctiform or short, and the male subgenital plate lacks hypovalves, as in *Kleiniella*. On the other hand the pterostigma is pedunculate, the fore wing is ellipsoid and, in *medleri*, the apical spurs of the hind tibia are arranged to form a distinct ventral group, features these two species have in common with *Ciriacremum* species.

The states of expression and functional significance of these characters are not at all clear. However, in Text-fig. 20, using nine characters, a highly speculative phylogeny displaying the relationships among *Kleiniella* species and between *Kleiniella* and *Ciriacremum* is given. The nine characters used and their states of expression are as follows.

1. Wing pattern: absent – plesiomorphic, present – apomorphic; Text-figs 58, 60.
2. Wing vein setae: short – plesiomorphic, long – apomorphic; Text-figs 57, 61.
3. Antennal setae: short – plesiomorphic, long – apomorphic; Text-figs 5, 6.
4. Pterostigma: pedunculate – plesiomorphic, sessile – apomorphic; Text-figs 52, 62.

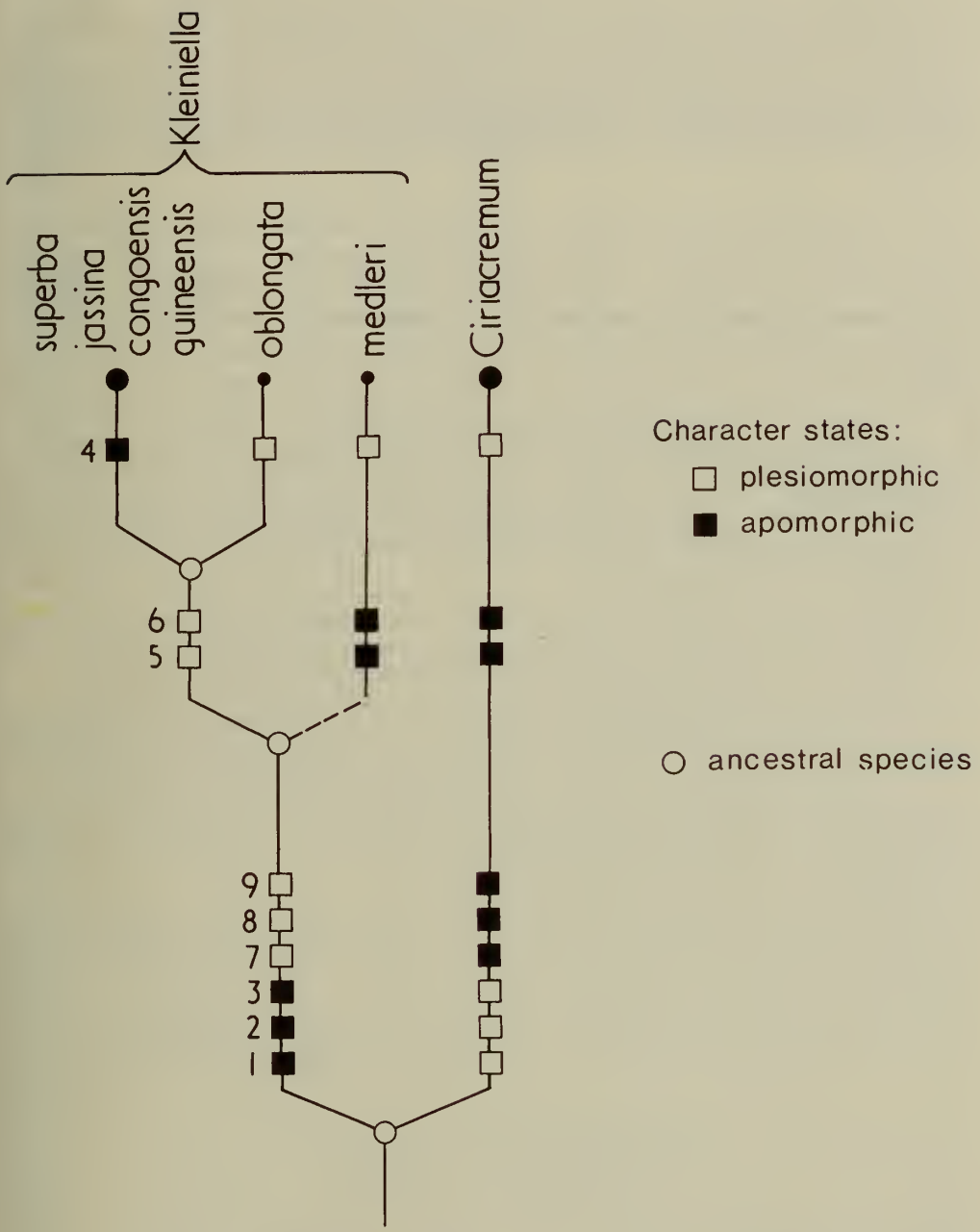


FIG. 20. Dendrogram of projected phylogeny within the Ciriacremini (for further explanation see text, p. 16).

5. Costal setae of hind wing: ungrouped – plesiomorphic, grouped – apomorphic; Text-figs 84, 90.
6. Hind tibial spurs: ungrouped ventrally – plesiomorphic, grouped ventrally – apomorphic; Text-figs 13, 14.
7. Body and leg setae: long – plesiomorphic, short – apomorphic; Text-figs 11, 12.
8. *rm* crossvein: punctiform – plesiomorphic, long – apomorphic; Text figs 58, 60.
9. Male hypovalves: absent – plesiomorphic, present – apomorphic; Text figs 96, 138.

It is postulated that the primitive Ciriacremini stock had all nine characters in the plesiomorphic condition. In the present day fauna where the characters are expressed in the apomorphic condition they are regarded as having been uniquely derived, although there are exceptions, e.g. *C. funestum* sp. n. has long hairs on the veins of the fore wing and a sessile pterostigma (see discussion of this species on p. 37).

Key to species of *KLEINIELLA*

1 Genal cones poorly developed, only represented by weakly swollen areas of genae (Text-fig. 31) 2
– Genal cones well developed, rounded or obtusely conical (Text-figs 30, 32, 33) . . 4
2 Pterostigma broadly sessile, trapezoidal (Text-fig. 52); male subgenital plate without hypovalves (Text-figs 96, 99) 3
– Pterostigma narrowly sessile, triangular (Text-fig. 82); male subgenital plate with well developed hypovalves (Text-fig. 129) ***Ciriacremum funestum*** sp. n. (p. 37)
3 Larger species, head width 0.96–1.12 mm; fore wing narrower, 2.40–2.72 times longer than wide, without spinules in costal cell or in proximal part of second radial cell (Text-fig. 52); apex of aedeagus as in Text-fig. 98; ♀ proctiger longer than hind tibia with downcurved apex (Text-fig. 187) . . . ***jassina*** (Enderlein) (p. 19)
– Smaller species, head with 0·85–0·93 mm; fore wing broader, 1·9–2·2 times longer than wide, spinules clearly present in costal cell and in proximal part of second radial cell (Text-fig. 53); apex of aedeagus as in Text-fig. 101; ♀ proctiger shorter than hind tibia, apical part not downcurved (Text-fig. 188) ***congoensis*** sp. n. (p. 20)
4 Pterostigma of fore wing pedunculate (Text-figs 57, 58) 5
– Pterostigma of fore wing sessile (Text-figs 51, 54–56) 6
5 Pterostigma short, about two and a half times longer than wide (Text-fig. 57); genal cones rounded rectangular (Text-fig. 32) . . ***oblongata*** (Vondracek) (p. 22)
– Pterostigma elongate, about eleven times longer than wide (Text-fig. 58); genal cones obtusely conical (Text-fig. 33) . . . . . ***medleri*** sp. n. (p. 23)
6 Pterostigma of fore wing broadly trapezoidal (Text-fig. 51) ***superba*** Aulmann (p. 18)
– Pterostigma of fore wing triangular or very narrowly trapezoidal (Text-figs 54–56) ***guineensis*** (Aulmann) (p. 21)

Kleiniella superba Aulmann, 1912

(Text figs 13, 51, 83, 185)

Kleiniella superba Aulmann, 1912*b* : 101, figs 1–4. LECTOTYPE ♀, Tanzania: 'D. O. Afrika, Mkulumuri b. Amani, xii. 05, Dr Schröders. G' (MNHU, Berlin), here designated [examined].
Kleiniella superba Aulmann; Aulmann, 1913 : 79.

Description. *Colouration.* Overall body colour olive-green; fore wing pattern as in Aulmann's original figure.

Structure. ♂ unknown.

♀. Head as wide as pronotum; genal cones well developed, obtusely conical. Fore wing (Text-fig. 51 and original figure) parallelogrammatic, pterostigma broadly trapezoidal; *Rs* and M_{1+2} in punctiform contact, first cubital cell elongate; costal setae of hind wing forming a continuous row (Text-fig. 83); apex of hind tibia with three inner and two outer spurs. Ovipositor conical (Text-fig. 185), proctiger relatively short, 1·30 times longer than hind tibia.

Measurements (±0·01 mm, based on single incomplete ♀). Maximum width of head, ♀ 1·18; length of ultimate rostral segment, ♀ 0·13; length of hind tibia, ♀ 0·99; length of ♀ proctiger, 1·29.

HOST PLANT. Unknown.

MATERIAL EXAMINED.

Lectotype and one paralectotype ♀, same data and depository as lectotype.

DISCUSSION. Aulmann's type-series of two females are the only specimens of this species available for study and both are in a poor state of preservation. A permanent preparation has been made of the remnants of the lectotype. The antennae are missing (they were not mentioned in the original description) and only part of one fore wing remains (Text-fig. 51). However, from this remnant material and Aulmann's original description it is clear that *superba* is distinct from other species in the genus, having the most derived form of fore wing shape and venation.

Kleiniella jassina (Enderlein, 1927) comb. n.

(Text-figs 3, 5, 11, 31, 52, 86, 96–98, 187)

Desmiostigma jassina Enderlein, 1927 : 241, fig. 1. Holotype ♀, CAMEROUN: 'Kamerun' (IPK, Eberswalde) [unavailable for study].

DESCRIPTION. *Colouration.* Overall body colour light green with orange-brown markings. Lateral ocelli orange; thoracic tergites brown medially, mesopleurites brown; legs green with brown tarsal segments; fore wing pattern as in Text-fig. 52; abdomen orange-brown dorsally and ventrally.

Structure. ♂. Head wider than pronotum; genal cones very poorly developed (Text-fig. 31); antennal flagellum 2·09–2·21 times longer than maximum width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·1 : 1·5 : 1·9 : 1·9 : 1·1 : 0·5; ultimate rostral segment 0·74–0·81 times as long as third antennal segment. Fore wing parallelogrammatic, 2·40–2·52 times longer than wide, spinule arrangement as in Text-fig. 52; pterostigma broadly trapezoidal, dorsal surface of veins with a double row of long hairs in proximal half of wing, in distal half the hairs are shorter; *Rs* makes punctiform contact with M_{1+2} or there is a very short *rm* crossvein; *Cu* stem about two and a half times longer than *M*+*Cu* stem; first cubital cell elongate, about twice as long as wide; apex of hind tibia with a pair of spurs on each side and a single ventral spur. Proctiger (Text-fig. 96) with oval lateral expansions in basal part and a short narrow apical part; paramere (Text-figs 96, 97) thumb-like, on inner surface with a large group of downwardly directed setae in apical part and a small median ridge in basal part; distal segment of aedeagus as in Text-fig. 98.

♀. Antennal flagellum 2·07–2·09 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·4 : 1·9 : 1·9 : 1·0 : 0·5; ultimate rostral segment 0·82 times as long as third antennal segment. Fore wing 2·49–2·65 times longer than wide. Ovipositor elongate conical (Text-fig. 187), proctiger 1·16–1·29 times longer than hind tibia, with downcurved apex.

Measurements (±0·01 mm, based on 6 ♂ and 3 ♀). Maximum width of head, ♂ 0·96–1·12, ♀ 1·02–1·12; length of antennal flagellum, ♂ 2·06–2·30, ♀ 2·13–2·26; length of ultimate rostral segment, ♂ 0·17–0·18, ♀ 0·18–0·19; length of fore wing, ♂ 3·00–3·63, ♀ 3·63–4·07; maximum width of fore wing, ♂ 1·25–1·46, ♀ 1·37–1·63; length of hind tibia, ♂ 1·08–1·23, ♀ 1·14–1·36; length of ♀ proctiger, 1·48–1·60.

HOST PLANT. Unknown.

MATERIAL EXAMINED.

ZAIRE: 1 ♂, Stanleyville, iv. 1928 (*A. Collart*); 3 ♂, 3 ♀, Yangambi, 0·47N–24·24E, x. 1956 (*N. L. H. Krauss*); 1 ♀, Elizabethville, xi. 1959, at light (*Ch. Seydel*). ANGOLA: 3 ♂, 1 ♀, Dundo, 4–29.viii.1953, light trap (*Luna*).

DISCUSSION. *K. jassina* is closely related to the following species and the two are regarded here as sister species. As both species have long setae on the antennal flagellum and the veins of the fore wing, a parallelogrammatic fore wing and a broadly trapezoid pterostigma, they are regarded here as more closely related to *K. superba* than the other three species of *Kleiniella*. *K. jassina* and *K. congoensis* clearly differ from *K. superba* in having poorly developed genal cones.

A number of cecidomyid fly larvae, probably of the genus *Endopsylla* (identified by K. M. Harris of the Commonwealth Institute of Entomology, London) were obtained from the abdomens of the series of specimens from Yangambi, Zaire.

Kleiniella congoensis sp. n.

(Text-figs 53, 87, 99–101, 188)

DESCRIPTION. *Colouration*. Similar to *jassina* but with darker orange markings; fore wing pattern as in Text-fig. 53.

Structure. ♂. Similar to *jassina* but smaller. Antenna missing from holotype; ultimate rostral segment short. Fore wing broader than in *jassina*, 1·97 times longer than wide, with a moderately dense covering of spinules (Text-fig. 53), costal cell and proximal part of second radial cell with spinules; *Cu* stem about twice as long as *M*+*Cu* stem, first cubital cell shorter than in *jassina*, only one and a half times longer than wide. Genitalia similar to *jassina*; paramere (Text-figs 99, 100) thumb-like, on inner surface with short conical setae in apical two-thirds, without tubercle or ridges; distal segment of aedeagus relatively simple (Text-fig. 101).

♀. Slightly larger than ♂. Antennal flagellum 2·03 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·3 : 1·9 : 2·0 : 1·3 : 0·6; ultimate rostral segment 0·89 times as long as third antennal segment and 1·45 times longer than tenth antennal segment. Fore wing 2·11 times longer than wide. Ovipositor short (Text-fig. 188), proctiger with straight apex, 0·81 times as long as hind tibia.

Measurements (±0·01 mm, based on 1 ♂ and 1 ♀). Maximum width of head, ♂ 0·85, ♀ 0·93; length of antennal flagellum, ♀ 1·88; length of ultimate rostral segment, ♂ 0·15, ♀ 0·16; length of fore wing, ♂ 2·76, ♀ 3·11; maximum width of fore wing, ♂ 1·40, ♀ 1·48; length of hind tibia, ♂ 0·97, ♀ 1·03; length of ♀ proctiger, 0·84.

HOST PLANT. Unknown.

Holotype ♂, ZAIRE: Yangambi, 0·47N–24·24E, x. 1956 (*N. L. H. Krauss*) (BMNH, London); slide mounted.

Paratypes. ZAIRE: ♀, same data as holotype. NIGERIA: 1 ♀, SE. State, Oban, 7.iv.1975 (*J. T. Medler*) (BMNH, London), slide and dry mounted.

DISCUSSION. Obviously *K. congoensis* sp. n. is closely related to *K. jassina* but shows significant differences in the structure of the fore wing and genitalia of both sexes. The type-series was apparently collected together with specimens of *jassina*. Unfortunately no indication of host plant data was given by the collector and host preference may be the isolating factor between the two species.

Kleiniella guineensis (Aulmann, 1912) comb. n.

(Text-figs 30, 54, 85, 102–104)

Phacosema guineensis Aulmann, 1912*a* : 35, figs 1–6. Holotype ♂, EQUATORIAL GUINEA: 'Span. Guinea, Nkolentangan, xi. 07–v. 08, G. Tessmann S.G.' (MNHU, Berlin) [examined].
Udamostigma guineensis (Aulmann) Aulmann, 1913 : 81.

DESCRIPTION. *Colouration.* Overall body colour brown with ochraceous markings; vertex brown medially, ochraceous laterally; genal cones brown; dorsum of thorax brown, pronotum ochraceous laterally, mesoscutum with poorly developed longitudinal ochraceous markings, meso- and metascutellum brown medially and ochraceous laterally, propleurites ochraceous, mesopleurites brown; fore wing hyaline with brown pattern as in Text-fig. 54; legs mainly ochraceous, apex of fore femur, dorsally, and fore tarsal segments brown, mid femur and tarsus brown, hind femur, basally, and hind tarsus brown; abdomen brown dorsally, ochraceous ventrally.

Structure. ♂. Head wider than pronotum; genal cones well developed (Text-fig. 30), obtusely conical. Fore wing ellipsoid, 2·45 times longer than wide, spinule arrangement as in Text-fig. 54; pterostigma triangular; *Cu* stem slightly more than one and a half times longer than *M*+*Cu* stem, first cubital cell twice as long as wide. Apex of hind tibia with a pair of spurs on each side and a single ventral spur. Proctiger (Text-fig. 102) with oval lateral expansions in basal part and a short narrow apical part; paramere (Text-figs 102, 103) thumb-like, on inner surface with a few downwardly directed setae in apical part and a subapical tooth; distal segment of aedeagus as in Text-fig. 104.

♀. Unknown.

Measurements (±0·01 mm, based on 1 ♂). Maximum width of head, ♂ 0·79; length of ultimate rostral segment, ♂ 0·12; length of fore wing, ♂ 3·21; maximum width of fore wing, ♂ 1·31; length of hind tibia, ♂ 0·81.

MATERIAL EXAMINED.

Holotype and one further ♂ specimen from 'Westafrika, Uelleburg, vi–viii. 08' *Tessmann S. G.*) (MNHU, Berlin).

DISCUSSION. *K. guineensis* differs from both *K. superba* and *K. jassina* in having an ellipsoid fore wing and a triangular pterostigma. The sessile form of the latter also separates *guineensis* from *K. oblongata* and *K. medleri*.

Apart from the material mentioned above two female specimens have been examined which show slight but obvious differences from the type-series. As I have no clear idea of the extent to which *K. guineensis* varies I cannot assign these specimens to that or any other named species. A brief indication of their main characteristics is given below.

Kleiniella sp. 1, near *guineensis*

(Text-fig. 55)

♀. Similar to *guineensis*. Antennal flagellum 2·43 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·4 : 1·8 : 1·8 : 1·0 : 0·5; ultimate rostral segment short, 0·57 times as long as third antennal segment. Fore wing (Text-fig. 55) 2·28 times longer than wide, with less well developed pattern than *guineensis* and broader pterostigma; *Cu* stem two and a half times as long as *M*+*Cu* stem, Cu_1 more steeply parabolic and first cubital cell slightly less than twice as long as wide. Proctiger relatively long, 1·77 times longer than hind tibia. ♂ unknown. Host plant unknown.

Measurements (±0·01 mm, based on 1 ♀). Maximum width of head, ♀ 0·86; length of antennal flagellum, ♀ 2·09; length of ultimate rostral segment, ♀ 0·12; length of fore wing, ♀ 3·15; maximum width of fore wing, ♀ 1·38; length of hind tibia, ♀ 0·74; length of ♀ proctiger, 1·31.

Material examined.

Nigeria: 1 ♀, SE. State, Obudu CR, 21.iii.1971 (*J. T. Medler*) (BMNH, London).

Kleiniella sp. 2, near *guineensis*

(Text-fig. 56)

♀. Similar to *guineensis* and preceding species. Genal cones rather more robust (Text-fig. 56); antennal flagellum 2·43 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·0 : 1·2 : 1·6 : 1·5 ; 0·8 : 0·3; ultimate rostral segment shorter, 0·45 times as long as third antennal segment. Fore wing slightly more parallelogrammatic (Text-fig. 56), 2·55 times longer than wide, pterostigma broadly triangular, *Cu* stem almost three times longer than *M*+*Cu* stem, first cubital cell about twice as long as wide. Proctiger shorter, 1·48 times longer than hind tibia. ♂ unknown. Host plant unknown.

Measurements (±0·01 mm, based on 1 ♀). Maximum width of head, ♀ 1·02; length of antennal flagellum, ♀ 2·48; length of ultimate rostral segment, ♀ 0·13; length of fore wing, ♀ 3·83; maximum width of fore wing, ♀ 1·38; length of hind tibia, ♀ 1·00; length of ♀ proctiger, 1·48.

Material examined.

Uganda: 1 ♀, Ruwenzori Range, Bwamba Pass (west side), xii. 1934–i. 1935, 5500′–7500′ [1680–2290 m] (*F. W. Edwards*) (BMNH, London).

Kleiniella oblongata (Vondracek, 1963) **comb. n.**

(Text-figs 32, 57, 84, 105–107)

Syndesmophlebia oblongata Vondracek, 1963 : 273, figs 31–45. Holotype ♂, Zaire: 'Rutshuru, 27.v.1936 (L. Lippens)' (MRAC, Tervuren) [examined].

Description (for more details see original description). ♂. Head wider than pronotum; genal cones well developed, rounded rectangular from above (Text-fig. 32); ultimate rostral segment short. Fore wing ellipsoid, 2·54 times longer than wide, spinule arrangement as in Text-fig. 57; pterostigma pedunculate, short; *Rs* and M_{1+2} in punctiform contact; first cubital cell elongate, more than twice as long as wide; *Cu* stem about three times longer than *M*+*Cu* stem; costal setae of hind wing forming a continuous row (Text-fig. 84); apex of hind tibia with three inner and two outer spurs. Proctiger (Text-fig. 105) with oval lateral expansions

in basal part and a short narrow apical part; paramere (Text-fig. 106) thumb-like, on inner surface with a subapical tooth and a number of downwardly directed setae in apical half, in basal half with a group of anteriorly directed setae; distal segment of aedeagus as in Text-fig. 107.

♀. Antennal flagellum 2·30 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·3 : 1·8 : 1·8 : 0·6 : 0·3; ultimate rostral segment 0·58 times as long as third antennal segment. Fore wing 2·57 times longer than wide. Proctiger relatively long, 1·80 times longer than hind tibia.

Measurements (±0·01 mm, based on 1 ♂ and 1 ♀). Maximum width of head, ♂ 1·36, ♀ 1·46; length of antennal flagellum, ♀ 3·37; length of ultimate rostral segment, ♂ 0·20, ♀ 0·21; length of fore wing, ♂ 5·10, ♀ 5·70; maximum width of fore wing, ♂ 2·00, ♀ 2·22; length of hind tibia, ♂ 1·13, ♀ 1·24; length of ♀ proctiger, 2·22.

HOST PLANT. Unknown.

MATERIAL EXAMINED.

Holotype and 1 ♀ paratype from ZAIRE: Luebo, viii. 1921 (*Lt. Ghesquière*) (MRAC, Tervuren). Both specimens had been dissected and mounted on several slides; some remounts were necessary.

DISCUSSION. Unlike the three previous species *K. oblongata* has a pedunculate pterostigma and an ellipsoid fore wing, features it has in common with *K. medleri* sp. n. and most species of *Ciriacremum*. It differs from *medleri* in the shape of the genal cones, the short pterostigma and the form of the male genitalia. It is placed in *Kleiniella* because of the long hairs on the veins of the fore wing, antennal flagellum and fore tibia, the absence of a ventral group of spurs at the apex of the hind tibia and the absence of hypovalves on the male subgenital plate.

Kleiniella medleri sp. n.

(Text-figs 33, 58, 88, 108–110, 186)

DESCRIPTION. *Colouration.* Overall body colour mid brown with light green or ochraceous markings; vertex green with central brown area and orange ocelli; genal cones green with reddish brown apices; antenna ochraceous with darkened area at joints of segments, segments nine and ten brown; pronotum brown anteriorly, green posteriorly and laterally; propleurites green; mesopraescutum brown with green lateral and hind margins and median longitudinal ochraceous stripe; mesoscutum brown with median greenish area, with a proximo-lateral ochraceous stripe and a disto-lateral green patch on each side; mesoscutellum brown with green antero-lateral areas; metascutellum green; parapteron brown dorsally, ochraceous-green ventrally; fore wing pattern as in Text-fig. 58; legs brown, hind tibia ochraceous; abdomen reddish brown dorsally, green dorso-laterally, dark brown ventro-laterally and yellow ventrally; ♂ proctiger with reddish apical part.

Structure. ♂. Head wider than pronotum; genal cones well developed, conical with rounded apices (Text-fig. 33); antennal flagellum relatively long, 4·23–4·48 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·4 : 1·4 : 1·8 : 0·5 : 0·2; ultimate rostral segment relatively short, 0·28–0·31 times as long as third antennal segment. Fore wing ellipsoid (Text-fig. 58), 2·36–2·48 times longer than wide; pterostigma pedunculate and very long, continuing almost to point where *Rs* meets costa; *Cu* stem almost twice as long as *M*+*Cu* stem; Cu_1 steeply parabolic and first cubital cell about 1·3 times longer than wide; costal setae of hind wing arranged into two groups (Text-fig. 88); apex of hind tibia with one inner and one outer spur and a ventral group of two or three spurs. Proctiger (Text-fig. 108) with triangular wing-like expansions on basal part and a short narrow apical part; paramere

(Text-figs 108, 109) thumb-like, on inner surface with a postero-apical ridge which ends in an apical tooth, apical part with a vertical row of five antero-ventrally directed setae, basal part with a large group of posteriorly directed setae; distal segment of aedeagus as in Text-fig. 110.

♀. Larger than ♂. Antennal flagellum 4·37–4·43 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·3 : 1·4 : 1·8 : 0·5 : 0·2; ultimate rostral segment 0·25–0·30 times as long as third antennal segment. Fore wing 2·36–2·43 times longer than wide. Proctiger moderately long (Text-fig. 186), 1·49–1·60 times longer than hind tibia.

Measurements (±0·01 mm, based on 7 ♂ and 6 ♀). Maximum width of head, ♂ 1·01–1·19, ♀ 1·03–1·26; length of antennal flagellum, ♂ 4·41–5·28, ♀ 4·55–5·58; length of ultimate rostral segment, ♂ 0·15–0·18; ♀ 0·16–0·18; length of fore wing, ♂ 2·92–3·42, ♀ 3·12–3·69; maximum width of fore wing, ♂ 1·18–1·40 ♀ 1·32–1·52; length of hind tibia, ♂ 0·78–0·95, ♀ 0·81–1·00; length of ♀ proctiger, 1·23–1·49.

Host plant. Unknown.

Holotype ♂, Nigeria: W. State, Ile–Ife, 25.iii.1969 (*J. T. Medler*) (BMNH, London). Dry mounted.

Paratypes. Nigeria: 2 ♂, 4 ♀, same data as holotype; 1 ♂, 28.ii.1970; 1 ♂, 19.iii.1970; 1 ♀, 30.vi. 1970; 2 ♂, 29.xii.1970; 4 ♂, 26.ii.1971; 1 ♂, 9.i.1973; 1 ♂, 1 ♀, Akure, x. 1974; 1 ♀ NW. State, Badeggi RRS, 19.iii.1972; 2 ♂, 14.xii.1974; 1 ♂, Abuja, 20.iii.1972; 1 ♂, 1 ♀, MW. State, Benin, 8.iv.1973; 4 ♂, 3 ♀, 1.iv.1975; 1 ♀, nr Siluko, iii. 1973; 3 ♂, 3 ♀, Udo FR, 11.iv.1975; 1 ♂, 1 ♀, W. State, Agbabu, 3.iii.1973; 1 ♂, BP. State, Takuni, 19.iii.1973; 1 ♂, 1 ♀, SE. State, Ikom, 4.iv.1975; 2 ♂, 1 ♀, Ibadan, 15.iii.1969 (*J. T. Medler*); 8 ♂, 3 ♀, Ibadan, Moor Plantation, 23. ix.–2.x.1960, light trap (*L. A. Mound*); 1 ♂, 1 ♀, Zaria, Samaru, 11.ix.1974, to light (*J. C. Deeming*). Ghana: 2 ♂, 2 ♀, Tafo, Cocoa Res. Inst., 1973, light trap (*N. A. K. Akotoye*). Sierra Leone: 1 ♀, Njala, 15.xi.–8.xii.1930, at light (*E. Hargreaves*). (BMNH, London; ZI, Leningrad; NCI, Pretoria). Slide and dry mounted.

Discussion. It is difficult to assign this species to a genus as it has features in common with both *Kleiniella* and *Ciriacremum* species. *K. medleri* sp. n. has long setae on the antennal flagellum, wing veins and legs, a short *rm* crossvein, and lacks hypovalves in the male, as in *Kleiniella*; but has a pedunculate pterostigma, a ventral group of spurs at the apex of the hind tibia, and grouped costal setae on the hind wing, as in *Ciriacremum*. On the basis that *medleri* sp. n. shares more derived features with *Kleiniella* species than *Ciriacremum* species it is arbitrarily placed in the former genus.

CIRIACREMUM Enderlein, 1910

Ciriacremum Enderlein, 1910*b* : 139. Type-species: *Ciriacremum filiverpatum* Enderlein, by original designation.

Ciriacremum Enderlein; Aulmann, 1913 : 80.

Ceriacremum Enderlein; Crawford, 1914 : 63, partim. [Incorrect subsequent spelling.]

Bunoparia Enderlein, 1926 : 397. Type-species: *Ciriacremum capillicorne* Enderlein, by original designation. **Syn. n.**

Description. Small to large size, head width 0·52–1·37 mm. Integument matt, with a moderate covering of short hairs. Head wider than pronotum and depressed from axis of body; each lateral half of vertex with a median concavity; genae from slightly swollen to having well

developed cones, distinctly separated from vertex by transverse sutures; anteoccipital lobes present; antenna filiform, short or long, flagellum 1·2 to more than 5·5 times longer than width of head, flagellar segments bearing short hairs; ultimate rostral segment short or long. Thorax, in profile, convex; propleurites subequal and both in contact with pronotum dorsally; fore wing ellipsoid, sometimes a little elongated, usually hyaline, rarely with a marginal infuscation distally, sometimes with small darkened areas in the marginal cells distally; pterostigma usually pedunculate, rarely sessile; veins usually bear short hairs on dorsal surface, rarely these hairs are longer than the width of veins; long *rm* crossvein present; costal setae of hind wing clearly arranged into two groups; fore tibia without long setae or with only a single seta dorsally; hind tibia with apical spurs arranged into lateral and ventral groups. Male subgenital plate mostly with a clearly developed pair of hypovalves, rarely fused to form a single structure, rarely without hypovalve development; proctiger usually with moderately narrow basal part and narrower apical part which is often as long as or longer than basal part. Female ovipositor conical, proctiger short or long, 1·0–2·7 times longer than hind tibia. Larva free-living psylloid type (Text-figs 24–27).

Distribution. West, central, east and southern Africa, in both forest and woodland areas (Maps 3–7); Central America.

Host plants. Data are known for eight of the 23 known species in the genus and all the host plants are from the family Caesalpiniaceae.

Discussion. From the phylogeny postulated above (p. 16) it can be seen that *Ciriacremum* species are separated from *Kleiniella* on the basis of common possession in the former of three derived features: short body and leg setae, a long *rm* crossvein, and the presence of hypovalves on the male subgenital plate. They also differ from most of the species in *Kleiniella*, *medleri* being the exception, in having grouped costal setae on the hind wing and apical spurs of the hind tibia forming a distinct ventral group; two further derived features. One of the most interesting of these attributes is the presence of hypovalves on the male subgenital plate. Development of these structures is very rare within the Psylloidea and I know of them occurring only in two other groups, *Mesohomotoma* and related genera, and an undescribed genus distributed in tropical Africa which may be a member of the Spondyliaspidae. The function of these structures is not known; they could be used by the male to orientate himself appropriately during copulation or to induce the required response in the female by tactile or visual stimulus. A study of these structures in relation to psyllid reproductive behaviour would be very interesting and informative. Three species in the genus, *filiverpatum capillicorne* and *capense*, lack these hypovalves and it is not clear whether this condition is primitive or the result of secondary loss.

By a comparative study of the male genitalia within the genus some species groups are easily defined but the relationships of a few species cannot be clearly shown so a phylogeny for *Ciriacremum* is not postulated. Some of the more obvious species groups are: *filiverpatum* with *pervatum*, *relatum* and *kleinielloides*; *bicaudatum* with *harteni*, *capeneri*, *carvalhoi*, *daubicatum*, *cabudiatum*, *tubacadium*, *jubernardioides* and *orientale*; and *africanum* with *megafricanum*, *vondraceki* and possibly *angolense*.

The type male of *C. capillicorne* could not be traced and no further material was available for study. As this species is the type-species of *Bunoparia* the synonymy given above must remain speculative. Enderlein separated *Bunoparia* from

Ciriacremum on the basis of the form of the genal cones. These structures are very variable interspecifically in the Ciriacremini and I do not think their form has any great significance when considering generic limits.

Key to species of *CIRIACREMUM*

1 Pterostigma sessile (Text-figs 63, 82) 2
– Pterostigma pedunculate (Text-figs 64–81) 3
2 Larger elongate species, head width 1·13 mm, antennal flagellum 4·27 times longer than width of head; fore wing 2·69 times longer than wide
kleinielloides sp. n. (p. 32)
– Smaller, more robust species, head width 0·78–0·93 mm; antennal flagellum 2·50–3·10 times longer than width of head; fore wing 2·3–2·5 times longer than wide . . . . . ***funestum*** sp. n. (p. 37)
3 Hairs on dorsal surface of veins of fore wing more than twice as long as width of veins (Text-fig. 58); hairs on segments of antennal flagellum longer than width of pedicel (Text-fig. 5) . . . . . ***Kleiniella medleri*** sp. n. (p. 23)
– Hairs on veins of fore wing short, not or hardly longer than width of veins (Text-fig. 60); hairs on antennal flagellum short, not longer than width of pedicel (Text-fig. 6) 4
4 Males 5
– Females 26
5 Subgenital plate without an extra pair of appendages (hypovalves) terminally (Text-figs 111, 132) 6
– Subgenital plate with a pair of hypovalves terminally (Text-figs 114, 126, 138) . 9
6 Proctiger with wing-like expansions laterally (Text-fig. 132) 7
– Proctiger without wing-like expansions laterally (Text-fig. 111)
filiverpatum Enderlein (p. 29)
7 Antenna very long, more than twice as long as length of body
capillicorne Enderlein (p. 35)
– Antenna shorter, at most as long as body 8
8 Genal cones short, from above wider than long (Text-fig. 47); fore wing with few spinules (Text-fig. 81). Southern Africa . . ***capense*** Enderlein (p. 35)
– Genal cones longer than wide; fore wing evenly and densely covered in spinules. Central America . . . . . ***setosum*** Crawford
9 Hypovalves fused to form a single structure (Text-figs 168, 170) ***capeneri*** sp. n. (p. 43)
– Hypovalves paired (Text-figs 114, 126, 138) 10
10 Hypovalves longer than or at least as long as parameres (Text-figs 129, 138) . 11
– Hypovalves shorter than parameres (Text-figs 114, 123, 172) 19
11 Membrane of fore wing densely and evenly covered with spinules (Text-fig. 75) . 12
– Membrane of fore wing at least with areas on either side of veins devoid of spinules (Text-figs 68, 78) 13
12 Antennal flagellum 1·6–2·2 times longer than maximum width of head
julbernardioides sp. n. (p. 45)
– Antennal flagellum 1·2–1·5 times longer than maximum width of head
orientale sp. n. (p. 46)
13 Antenna short, flagellum 1·9–2·3 times longer than width of head
harteni sp. n. (p. 42)
– Antenna longer, flagellum 2·6–3·4 times longer than width of head . . . 14
14 Genal cones poorly developed (Text-fig. 49); distal segment of aedeagus relatively short and robust with a long terminal tube (Text-fig. 180) ***vondraceki*** sp. n. (p. 51)
– Genal cones well developed (Text-figs 38–42); distal segment of aedeagus relatively long and thin, with a short terminal tube (Text-figs 141, 149) 15

15 Hypovalves with a small group of specialized setae subapically on dorsal surface (Text-fig. 161) . . . . . ***carvalhoi*** sp. n. (p. 41)
– Hypovalves without a group of specialized setae subapically but often with such a group medially on dorsal surface (Text-figs 138, 143) 16
16 Third antennal segment 2·3–2·7 times longer than ultimate rostral segment; distal segment of aedeagus with broad apex (Text-fig. 149) . ***cabudiatum*** sp. n. (p. 40)
– Third antennal segment less than 2·2 times longer than ultimate rostral segment; apex of distal segment of aedeagus narrower (Text-figs 141, 145) . . . 17
17 Hypovalves very long and narrow, apical part no wider than apical part of proctiger, median group of specialized setae well developed (Text-fig. 143) ***daubicatum*** sp. n. (p. 40)
– Hypovalves broader, apical part almost twice as wide as apical part of proctiger, median group of specialized setae poorly developed (Text-figs 138, 139, 150) . 18
18 Paramere with long and narrow apical part, on inner surface the postero-medial group of setae are restricted to an area immediately below the tooth (Text-fig. 140); hypovalves with inner postero-vertical row of setae relatively well developed (Text-fig. 16) . . . . . ***bicaudatum*** Enderlein (p. 37)
– Paramere with a very short narrow apical part, on inner surface the postero-medial group of setae are curved and extended to form a compound vertically arranged group (Text-fig. 151); hypovalves with inner postero-vertical row of setae poorly developed (Text-fig. 150) . . . . . ***tubacadium*** sp. n. (p. 44)
19 Antennal flagellum at most 2·5 times longer than maximum width of head . . 20
– Antennal flagellum at least 4·0 times longer than width of head 22
20 Paramere broad, shorter than proctiger, with a longitudinally arranged group of sensory pegs on inner surface (Text-fig. 176); antennal flagellum not more than 2·2 times longer than width of head; ultimate rostral segment longer than length of third antennal segment 21
– Paramere narrow, about as long as proctiger, without trace of specialized sensory pegs on inner surface (Text-fig. 136); antennal flagellum not less than 2·3 times longer than width of head; ultimate rostral segment much shorter than third antennal segment . . . . . ***jilorense*** sp. n. (p. 52)
21 Ultimate rostral segment shorter, 1·00–1·45 times longer than third antennal segment . . . . . ***africanum*** Enderlein (p. 48)
– Ultimate rostral segment longer, 1·50–1·75 times longer than third antennal segment ***megafricanum*** sp. n. (p. 49)
22 Postero-basal patch of sensory hairs on inner surface of paramere present (Text-figs 115, 118, 121, 127) 23
– Postero-basal patch of sensory hairs on inner surface of paramere absent (Text-figs 123, 124) . . . . . ***nigeriense*** sp. n. (p. 33)
23 Genal cones represented by two rounded areas, often shiny brown or black (Text-fig. 34) 24
– Genal cones, although small, clearly present and not at all shiny (Text-figs 35, 37) . 25
24 Ultimate rostral segment long, 2·29 times longer than tenth antennal segment; $M+Cu$ stem about two-thirds as long as Cu stem (Text-fig. 61); paramere as in Text-fig. 118 . . . . . ***relatum*** sp. n. (p. 31)
– Ultimate rostral segment shorter, 1·48–1·88 times longer than tenth antennal segment; $M+Cu$ stem at most half as long as Cu stem (Text-fig. 62); paramere as in Text-fig. 115 . . . . . ***pervatum*** sp. n. (p. 30)
25 Antennal flagellum shorter, 4·19 times longer than width of head; Cu_1 steeply parabolic, second radial cell devoid of spinules (Text-fig. 64) . ***angolense*** sp. n. (p. 34)
– Antennal flagellum longer, 4·90–5·26 times longer than width of head; Cu_1 weakly parabolic, second radial cell with spinules at least in distal half (Text-fig. 65) ***nigripes*** sp. n. (p. 32)
26 Fore wing densely and evenly covered with spinules (Text-fig. 75) . . . 27

– Fore wing at least with narrow bands on either side of veins devoid of spinules and often with other areas without spinules (Text-figs 78, 79) 29

27 Genal cones well developed, longer than wide. Central America
setosum (Crawford)

– Genal cones moderately developed, wider than long. Ethiopian region . . 28

28 Antennal flagellum 1·7–2·3 times longer than width of head
julbernardioides sp. n. (p. 45)

– Antennal flagellum 1·2–1·4 times longer than width of head ***orientale*** sp. n. (p. 46)

29 Antennal flagellum not more than 3·3 times longer than width of head . . 34

– Antennal flagellum not less than 3·9 times longer than width of head . . 30

30 Ultimate rostral segment relatively short (Text-fig 3), 1·1–1·6 times longer than tenth antennal segment; genal cones present but poorly developed (Text-figs 35, 36) 31

– Ultimate rostral segment relatively long (Text-fig. 4), 1·7–2·5 times longer than tenth antennal segment; genal areas only slightly swollen and often shiny brown or black 32

31 Ovipositor relatively short, proctiger 1·58–1·76 times longer than hind tibia, valves of ovipositor not modified (Text-fig. 188) . . . ***nigripes*** sp. n. (p. 32)

– Ovipositor relatively long, proctiger 2·22–2·49 times longer than hind tibia, valves of ovipositor elongated apically (Text-fig. 189) . . ***nigeriense*** sp. n. (p. 33)

32 Antennal flagellum very long, 5·5–6·2 times longer than width of head; larger species, hind tibia 1·0–1·1 mm long . . . . ***relatum*** sp. n. (p. 31)

– Antennal flagellum shorter, 3·9–5·3 times longer than head width; smaller species, hind tibia 0·70–0·90 mm long 33

33 Ultimate rostral segment shorter, 1·7–1·9 times longer than 10th antennal segment; proctiger longer, 2·4–2·7 times longer than hind tibia . ***pervatum*** sp. n. (p. 30)

– Ultimate rostral segment longer, 2·0–2·5 times longer than 10th antennal segment; proctiger shorter, 2·0–2·2 times longer than hind tibia ***filiverpatum*** Enderlein (p. 29)

34 Antennal flagellum 2·7–3·3 times longer than width of head; genal cones usually well developed (Text-figs 38–40) 35

– Antennal flagellum not more than 2·4 times longer than width of head; genal cones poorly developed (Text-fig. 48) 40

35 Proctiger less than 1·5 times longer than hind tibia 36

– Proctiger more than 1·5 times longer than hind tibia 38

36 Smaller species, head width about 0·71 mm; ultimate rostral segment relatively long, 0·58–0·62 times as long as third antennal segment; ovipositor shorter, less than 1·1 times longer than hind tibia . . . . ***vondraceki*** sp. n. (p. 51)

– Larger species, head width 0·78–0·94 mm; ultimate rostral segment relatively short, 0·39–0·52 times as long as third antennal segment; ovipositor longer, 1·28–1·41 times longer than hind tibia 37

37 Fore wing relatively narrow, 3·2–3·6 times longer than width of head, pterostigma small (Text-fig. 70) . . . . . ***cabudiatum*** sp. n. (p. 40)

– Fore wing relatively broad, 2·8–3·1 times longer than width of head, pterostigma large (Text-fig 81) . . . . . ***capense*** Enderlein (p. 35)

38 Third antennal segment not more than 2·0 times longer than ultimate rostral segment 39

– Third antennal segment not less than 2·1 times longer than ultimate rostral segment
carvalhoi sp. n. (p. 41)

39 Proctiger 1·6–1·8 times longer than hind tibia . . . ***daubicatum*** sp. n. (p. 40)

– Proctiger more than 1·9 times longer than hind tibia
bicaudatum Enderlein (p. 37) and ***tubacadium*** sp. n. (p. 44)

40 Ultimate rostral segment longer than third antennal segment 41

– Ultimate rostral segment shorter than third antennal segment 42

41 Proctiger relatively long, 1·7–1·9 times longer than hind tibia; ultimate rostral segment relatively long, 1·4–1·8 times longer than third antennal segment ***megafricanum*** sp. n. (p. 49)

– Proctiger relatively short, 1·3–1·5 times longer than hind tibia; ultimate rostral segment relatively short, 1·0–1·3 times longer than third antennal segment ***africanum*** Enderlein (p. 48)

42 Second radial cell of fore wing with no spinules proximally and only a few spinules in distal part (Text-fig. 80) . . . . . ***jilorense*** sp. n. (p. 52)

– Second radial cell of fore wing more evenly spinuled throughout (Text-figs 72, 74) . 43

43 Fore wing narrow, 2·36–2·69 times longer than wide; proctiger longer, 1·5–1·7 times longer than hind tibia . . . . . ***capeneri*** sp. n. (p. 43)

– Fore wing wider, 2·26–2·40 times longer than wide; proctiger shorter, 1·3–1·4 times longer than hind tibia . . . . . ***harteni*** sp. n. (p. 42)

Ciriacremum filiverpatum Enderlein, 1910

(Text-figs 4, 34, 60, 90, 111–113, 190)

Ciriacremum filiverpatum Enderlein, 1910*b* : 139, text-fig. A, fig. 1. LECTOTYPE ♂, Tanzania: 'Deutsches Ost Afrika' (NR, Stockholm), here designated [examined].
Ciriacremum filiverpatum Enderlein; Aulmann, 1912*b* : 101.
Ciriacremum filiverpatum Enderlein; Aulmann, 1913 : 80.

Description. *Colouration.* Overall body colour mid brown with ochraceous and black markings; vertex brown, ocelli orange, anteoccipital lobes ochraceous; genae ochraceous, each with a median shiny brown or black area; pronotum dark brown anteriorly and laterally, posterior margin ochraceous; mesopraescutum brown with ochraceous postero-lateral patches; mesoscutum brown, often with broad median longitudinal dark stripe and pale lateral patches; mesoscutellum brown with ochraceous antero-lateral corners; metascutellum ochraceous; tegula and pleurae light brown; wings hyaline; legs ochraceous with darkened tarsal segments; abdomen dark brown dorsally, ochraceous ventrally.

Structure. ♂. Anteoccipital lobes close to lateral ocellar humps; genae rounded, hardly swollen (Text-fig. 34); antenna long, flagellum 4·03–4·69 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·2 : 1·4 : 1·7 : 0·4 : 0·2; ultimate rostral segment long, 0·40–0·52 times as long as third antennal segment and 2·04–2·51 times longer than 10th antennal segment. Fore wing elongate, 2·71–2·84 times longer than wide; *Cu* stem slightly more than twice as long as *M*+*Cu* stem; first cubital cell elongate, about two and a half times longer than wide; spinule arrangement as in Text-fig. 60. Proctiger (Text-fig. 111) with simple basal part and a moderately long and narrow apical part; paramere (Text-figs 111–112) laterally flattened, pentagonal, on inner surface with a small anterior subapical tooth, a large apical tooth and a postero-apical ridge, in basal part with a large group of posteriorly directed hairs; distal segment of aedeagus as in Text-fig. 113; subgenital plate without hypovalves (Text-fig. 111).

♀. Larger than ♂. Antennal flagellum 3·96–4·55 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·2 : 1·4 : 1·8 · 0·4 : 0·2; ultimate rostral segment 0·45–0·52 times as long as third antennal segment and 2·02–2·47 times longer than tenth antennal segment. Fore wing 2·77–2·89 times longer than wide. Ovipositor long (Text-fig. 190), proctiger 2·05–2·17 times longer than hind tibia.

Measurements (±0·01 mm, based on 10 ♂ and 6 ♀). Maximum width of head, ♂ 0·99–1·09, ♀ 1·01–1·12; length of antennal flagellum, ♂ 4·11–4·90, ♀ 4·32–4·67; length of ultimate rostral segment, ♂ 0·25–0·29, ♀ 0·27–0·29; length of fore wing, ♂ 3·00–3·43, ♀ 3·25–3·70; maximum width of fore wing, ♂ 1·06–1·23, ♀ 1·13–1·33; length of hind tibia, ♂ 0·78–0·89, ♀ 0·77–0·89; length of ♀ proctiger, 1·67–1·92.

Host plant. Some adults have been collected from *Brachystegia spiciformis* Bentham in Rhodesia but the bulk of the material examined was collected at light.

Material examined.

Central African Republic: 2 ♂, 2 ♀, La Maboke, 7.xi.1966, at light (*M. Boulard*). Zaire: 1 ♀, Katanga, Elizabethville, ix. 1925; 11 ♂, 4 ♀, x. 1926; 7 ♂, 8 ♀, x. 1936; 12 ♂, 9 ♀, ix.–xii. 1949, at light; 1 ♂, x. 1954, at light; 1 ♂, 1 ♀ ix. 1958–v. 1959, at light; 8 ♂, 18 ♀, ix.–x. 1959, at light (*Ch. Seydel*); 1 ♂, 2 ♀, ii. 1940 (*H. Bredo*); 3 ♂, 2 ♀, ix. 1931 (*T. D. A. Cockerell*); 1 ♀ Kapema, ix. 1924 (*Ch. Seydel*); 2 ♀, Kanzenze, 12.viii.1931 (*G. F. de Witte*); 2 ♀, Kundelungu, riv. Kalumbulwa, 18.x.1951 (*G. Marlier*); 6 ♂, 5 ♀, Kolwezi, 5.x.1953, at light (*Mme L. Gilbert*); 1 ♂, 1 ♀, Bianco, 8–11.viii.1931 (*J. & L. Ogilvie*); 1 ♀, Sakania, ix. 1931 (*A. Mackie*); 3 ♂, 5 ♀, Kivu, Kavimvira (Uvira), ix.–x. 1954, at light (*G. Marlier*). Angola: 2 ♀, Gangassol, x. 1972, at light; 1 ♂, 10 ♀, Nova Lisboa, 23.ix.1968 (*M. Umbelina*); 4 ♂, 10 ♀, 19–27.viii.1974, at light; 82 ♂, 5 ♀, Chianga, 7–9.xi.1966, at light; 15 ♂, 25 ♀, 17.x.1972, at light; 39 ♂, 50 ♀, 26.viii.1974, at light (*J. Passos de Carvalho*); 1 ♂, 2 ♀, 5–19.ix.1970, yellow tray (*A. van Harten*); 1 ♀, 8.ix.1963, at light (*H. Cardosa*); 16 ♂, 16 ♀, Ceilunga, 8.x.1972, at light; 2 ♂, 2 ♀, Cela, 27.viii. 1973; 1 ♂, Salazar, I.I.A.A., 29.xi.1972, at light; 1 ♀, viii. 1973 (*J. Passos de Carvalho*); 4 ♂, 2 ♀, Dundo, 4–29.viii.1953, light trap (*Luna*); 2 ♀, Benguela, Baia Farta (12·36S, 13·12E), vi. 1963, at light (*Aldino Victorina*); 1 ♀, Luzamba (9·03S, 18·07E), 22.v.–2.vi.1971, at light (*S. A. Peles*); 1 ♀, Lac Calundo (11·48S, 20·52E), 1150 m, 19.xii.1954, at light (*Machado & Luna*). Tanzania: 3 ♂, 4 ♀, 'Deutsches Ost Afrika' (type-series). Rhodesia: 6 ♂, 8 ♀, Salisbury, 21.xi.1967, from *Brachystegia spiciformis* (*J. R. McDaniel*); 1 ♂, 2 ♀, Bulawayo, iv. 1968, at light (*B. M. Gerard*); 5 ♂, 7 ♀, Gokwe Distr., nr Kandariandzee Pan, viii.–ix. 1974, light trap (*G. F. Cockbill*).

Discussion. *C. filiverpatum*, together with the following three species, seem to form a natural group within the genus *Ciriacremum*. All these species have a peculiar head shape in which the genal areas are only slightly swollen and are mostly shiny brown or black. Apart from *C. kleinielloides*, which is only known from the female, they all have similar male genitalia; the paramere is of a similar form, showing slight variations in the form of the apical teeth and ridges (Text-figs 112, 115, 118); the distal segment of the aedeagus is very similar (Text-figs 113, 116, 119); and the subgenital plate shows a complete progression from having well developed hypovalves in *C. pervatum* sp. n. (Text-fig. 114), through partly reduced hypovalves in *C. relatum* sp. n. (Text-fig. 117) to their complete reduction in *C. filiverpatum*. In all four species the wing shape and venation is very similar.

Enderlein's type-series is stored in alcohol and permanent microscopical preparations have been made of the lectotype and male paralectotype.

Ciriacremum pervatum sp. n.

(Text-figs 12, 62, 114–116)

Description. *Colouration.* Overall body colour varies from ochraceous to dark brown, probably depending on maturity; genae with central shiny brown or black areas, as in *C. filiverpatum*.

Structure. ♂. Similar to *C. filiverpatum*. Antennal flagellum relatively longer, 4·70–5·36 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·2 : 1·4 : 1·8 : 0·5 : 0·2; ultimate rostral segment relatively shorter, 0·32–0·40 times as long as third antennal segment and 1·48–1·98 times longer than tenth antennal segment. Fore wing narrower, 2·89–3·24 times longer than wide; venation similar to *C. filiverpatum*, spinule arrangement as in Text-fig. 62. Proctiger (Text-fig. 114) and distal segment of aedeagus (Text-fig. 116) similar to *C. filiverpatum*; paramere (Text-figs 114, 115) on inner surface with more strongly developed apical tooth and posteroapical ridge; subgenital plate with short, broad, but well developed hypovalves (Text-fig. 114).

♀. Antennal flagellum 4·72–5·22 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·1 : 1·3 : 1·5 : 1·8 : 0·4 : 0·2; ultimate rostral segment 0·33–0·36 times as long as third antennal segment and 1·72–1·88 times longer than tenth antennal segment. Fore wing 2·91–3·06 times longer than wide. Proctiger relatively longer, 2·44–2·70 times longer than hind tibia.

Measurements (±0·01 mm, based on 5 ♂, 4 ♀). Maximum width of head, ♂ 0·97–1·13, ♀ 1·08–1·23; length of antennal flagellum, ♂ 4·57–6·00, ♀ 5·10–6·30; length of ultimate rostral segment, ♂ 0·20–0·24, ♀ 0·23–0·26; length of fore wing, ♂ 2·78–3·27, ♀ 3·23–3·46; maximum width of fore wing, ♂ 0·95–1·06, ♀ 1·09–1·19; length of hind tibia, ♂ 0·70–0·75, ♀ 0·71–0·79; length of ♀ proctiger, 1·86–2·03.

HOST PLANT. Unknown.

Holotype ♂, NIGERIA: SE. State, Onya, 17.iii.1971 (*J. T. Medler*) (BMNH, London); dry mounted.

Paratypes. NIGERIA: 1 ♂, 5 ♀, Obudu CR, 21.iii.1971; 2 ♂, Ikom, 4.iv.1975; 1 ♂, W. State, Owena FR, 15.iii.1970; 2 ♀, Ile-Ife, 30.x.1968; 1 ♀, 30.x.1969; 1 ♂, 15.i.1970; 1 ♀, 26.ii.1970; 3 ♂, 29.xii.1970; 2 ♂, 2 ♀, 25.x.1971; 2 ♂, 1 ♀, 30.xii.1971; 1 ♀, Erin-Odo, 20.ii.1970 (*J. T. Medler*); 1 ♂, Erin-Odo, Waterfall, 17.iii.1972 (*E. W. Classey*) (BMNH, London); slide and dry mounted.

DISCUSSION. See preceding species.

Ciriacremum relatum sp. n.

(Text-figs 61, 117–119)

DESCRIPTION. *Colouration*. Overall body colour and pattern very similar to *C. filiverpatum* but genal humps hardly darkened.

Structure. ♂. Larger, more robust and a little more densely haired than *C. filiverpatum*. Antennal flagellum 5·79–5·97 times longer than width of head, relative lengths of flagellar segment from base to apex – 1·0 : 0·9 : 1·1 : 1·3 : 1·6 : 2·1 : 0·5 : 0·2; ultimate rostral segment 0·46–0·49 times as long as third antennal segment and 2·25–2·34 times longer than tenth antennal segment. Fore wing 2·62–2·73 times longer than wide; *Cu* stem only about one and a half times longer than *M*+*Cu* stem; first cubital cell elongate, more than twice as long as wide; spinule arrangement as in Text-fig. 61. Paramere (Text-figs 117–118) less robust than in *C. filiverpatum* and the apical teeth and ridge are less well developed; subgenital plate has reduced but clearly developed hypovalves (Text-fig. 117).

♀. Larger than ♂. Antennal flagellum 5·55–6·12 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·3 : 1·8 : 2·3 : 0·5 : 0·2; ultimate rostral segment 0·47–0·49 times as long as third antennal segment and 1·92–2·15 times longer than 10th antennal segment. Fore wing 2·65–2·72 times longer than wide. Ovipositor long, proctiger 2·02–2·08 times longer than hind tibia.

Measurements (±0·01 mm, based on 4 ♂ and 3 ♀). Maximum width of head, ♂ 1·26–1·31, ♀ 1·30–1·37; length of antennal flagellum, ♂ 7·37–7·60, ♀ 7·60–7·95; length of ultimate rostral

segment, ♂ 0·42–0·43, ♀ 0·41–0·42; length of fore wing, ♂ 3·42–3·51, ♀ 3·78–3·95; maximum width of fore wing, ♂ 1·26–1·32. ♀ 1·43–1·46; length of hind tibia, ♂ 1·02–1·09, ♀ 1·02–1·08; length of ♀ proctiger, 2·08–2·24.

Host plant. Unknown.

Holotype ♂, Nigeria: SE. State, Ikom, 4.iv.1975 (*J. T. Medler*) (BMNH, London); dry mounted.

Paratypes. Nigeria: 7 ♂, 14 ♀, same data as holotype; 2 ♂, 4 ♀, Oban, 7.iv.1975; 2 ♂, MW. State, Udo FR, 11.iv.1975; 1 ♂, W. State, Owena, 15.ii.1970 (*J. T. Medler*) (BMNH, London; and ZI, Leningrad); slide and dry mounted.

Discussion. See *C. filiverpatum* Enderlein (p. 30).

Ciriacremum kleinielloides sp. n.

(Text-fig. 63)

Description. ♂. Unknown.

♀. Similar to *C. filiverpatum*. Antennal flagellum 4·27 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·1 : 1·5 : 1·7 : 2·3 : 0·5 : 0·3; ultimate rostral segment very long, 0·65 times as long as third antennal segment and 2·6 times longer than tenth antennal segment. Fore wing elongate, 2·69 times longer than wide; pterostigma sessile, broadly trapezoidal; first cubital cell shorter, about one and a half times longer than wide; *Cu* stem more than three times longer than *M*+*Cu* stem; spinule arrangement as in Text-fig. 63. Ovipositor of moderate length, proctiger 1·89 times longer than hind tibia.

Measurements (±0·01 mm, based on 1 ♀). Maximum width of head, ♀ 1·13; length of antennal flagellum, ♀ 4·81; length of ultimate rostral segment, ♀ 0·34; length of fore wing, ♀ 3·29; maximum width of fore wing, ♀ 1·23; length of hind tibia, ♀ 0·87; length of ♀ proctiger, 1·63.

Host plant. Unknown; collected at light by waterfall.

Holotype ♀, Angola: Cachoeiras, 20 mls [32 km] SW. Gabela, 18–19.iii.1972, at light (*BM Southern Africa Expedition*) (BMNH, London); slide mounted.

Discussion. This species is unusual for the genus *Ciriacremum* as the fore wing pterostigma is sessile, as in the genus *Kleiniella*. However, other characters suggest it is placed more naturally in *Ciriacremum*. The head and wing shape are similar to *C. filiverpatum* but *C. kleinielloides* may be distinguished from that species by the relative proportions of the *Cu* stem to the *M*+*Cu* stem, the shape of the first cubital cell and the shorter ovipositor.

Ciriacremum nigripes sp. n.

(Text-figs 35, 65, 120–122)

Description. *Colouration*. Overall body colour ochraceous and green; ocelli orange; fore wing hyaline; apical segment of fore tarsus brown or black; abdomen creamy white ventrally.

Structure. ♂. Medium size. Genal cones small but clearly developed (Text-fig. 35); antenna long, flagellum 4·90–5·26 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·4 : 1·4 : 2·0 : 0·4 : 0·2; ultimate rostral segment short, 0·29–0·32 times as long as third antennal segment and 1·23–1·36 times longer than

tenth antennal segment. Fore wing 2·49–2·63 times longer than wide, spinule arrangement as in Text-fig. 65; pterostigma elongate; *Cu* stem almost three times longer than *M*+*Cu* stem; Cu_1 shallowly parabolic and first cubital cell about twice as long as wide. Proctiger (Text-fig. 120) with simple basal part and a moderately long and narrow apical part; paramere (Text-figs 120, 121) compressed with truncate apex, on inner surface in apical half with a transverse apical ridge, a small group of antero-ventrally directed setae and a large group of postero-ventrally directed setae, basal part with a posterior process bearing a large group of posteriorly directed hairs; distal segment of aedeagus as in Text-fig. 122; subgenital plate with short broad hypovalves (Text-fig. 120).

♀. Antennal flagellum 4·95–5·42 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·4 : 1·5 : 2·0 : 0·4 : 0·2; ultimate rostral segment 0·30–0·35 times as long as third antennal segment and 1·27–1·39 times longer than tenth antennal segment. Fore wing 2·53–2·62 times longer than wide. Proctiger moderately long, 1·58–1·76 times longer than hind tibia.

Measurements (±0·01 mm, based on 5 ♂ and 5 ♀). Maximum width of head, ♂ 0·77–0·87, ♀ 0·84–0·91; length of antennal flagellum, ♂ 4·18–4·52, ♀ 4·18–4·62; length of ultimate rostral segment, ♂ 0·15–0·16, ♀ 0·15–0·17; length of fore wing, ♂ 2·75–3·11, ♀ 2·97–3·28; maximum width of fore wing, ♂, 1·08–1·23, ♀ 1·14–1·30; length of hind tibia, ♂ 0·65–0·67, ♀ 0·64–0·70; length of ♀ proctiger, 1·08–1·19.

HOST PLANT. Unknown.

Holotype ♂, NIGERIA: SE. State, Obudu CR, 13.iv.1973 (*J. T. Medler*) (BMNH, London); dry mounted.

Paratypes. NIGERIA: 2 ♂, same data as holotype; 12 ♂, 5 ♀, 21.iii.1971; 3 ♂, 3 ♀, Onya, 17.iii.1971; 26 ♂, Oban, 7.iv.1975; 18 ♂, 9 ♀, EC. State, Umuahia, 10.iv.1973; 16 ♂, 3 ♀, MW. State, Udo FR, 11.iv.1975; 1 ♂, W. State, Ile–Ife, 26.ii.1970; 1 ♂, NW. State, Bida CRH, 1.ix.1970 (*J. T. Medler*); 1 ♀, Ibadan, 9.iv.1966, at light trap (*Dept. Agric. Res.*); 1 ♀, Lagos, Ikoyi, 7.iii.1975 (*M. A. Cornes*) (BMNH, London; MRAC, Tervuren; and USNM, Washington); slide and dry mounted.

DISCUSSION. *C. nigripes* sp. n. and the following species have very similar general body form and fore wing shape and venation but both species have distinctive male and female genitalia and are probably not very closely related. In *C. nigripes* the general form and chaetotaxy of the male paramere is unlike any other species in the genus although it has the postero-basal sensory patch of hairs common in *Ciriacremum* species.

Ciriacremum nigeriense sp. n.

(Text-figs 36, 66, 123–125, 189)

DESCRIPTION. *Colouration.* Overall body colour very similar to *C. nigripes* but apical segment of fore tarsus ochraceous.

Structure. ♂. Very similar to *C nigripes*. Antennal flagellum shorter, 4·0–4·68 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·2 : 1·3 : 1·3 : 1·5 : 0·4 : 0·2; ultimate rostral segment 0·29–0·39 times as long as third antennal segment and 1·18–1·5 times longer than tenth antennal segment. Fore wing slightly more elongate, 2·58–2·78 times longer than wide, spinule arrangement as in Text-fig. 66. Proctiger (Text-fig. 123) with relatively longer apical part; paramere (Text-figs 123, 124) thumb-like with subconical apex, inner surface in apical half with a diagonal row of five to seven antero-ventrally directed setae and a small tooth posteriorly; distal segment of aedeagus as in Text-fig. 125; hypovalves short and narrow (Text-fig. 123).

♀. Larger than ♂. Antennal flagellum 4·34–4·72 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·3 : 1·3 : 1·5 : 0·4 : 0·2; ultimate rostral segment 0·33–0·38 times as long as third antennal segment and 1·18–1·53 times longer than tenth antennal segment. Fore wing 2·76–2·91 times longer than wide. Ovipositor (Text-fig. 189) elongated in apical half with the ventral valves thickened, proctiger 2·22–2·49 times longer than hind tibia.

Measurements (±0·01 mm, based on 7 ♂ and 6 ♀). Maximum width of head, ♂ 0·69–0·81, ♀ 0·77–0·84; length of antennal flagellum, ♂ 2·74–3·82, ♀ 3·46–3·91; length of ultimate rostral segment, ♂ 0·13–0·15, ♀ 0·14–0·16; length of fore wing, ♂ 2·27–2·83, ♀ 2·84–3·24; maximum width of fore wing, ♂ 0·83–1·03, ♀ 1·01–1·14; length of hind tibia, ♂ 0·48–0·64, ♀ 0·54–0·65; length of ♀ proctiger, 1·34–1·45.

Host plant. Unknown.

Holotype ♂, Nigeria: SE. State, Ikom, 4.iv.1975 (*J. T. Medler*) (BMNH, London); dry mounted.

Paratypes. Nigeria: 22 ♂, 16 ♀, same data as holotype; 2 ♂, Onya, 17.iii.1971; 1 ♂, Obudu CR, 13.iv.1973; 22 ♂, 2 ♀, Oban, 7.iv.1975; 1 ♂, 2 ♀, EC. State, Umuahia, 10.iv.1973; 3 ♂, MW. State, Udo FR, 11.iv.1975; 1 ♀, W. State, Ile–Ife, 25.iii.1969 (*J. T. Medler*) (BMNH, London; MRAC, Tervuren; and USNM, Washington) slide and dry mounted.

Discussion. Superficially *C. nigeriense* sp. n. resembles the preceding species but the male genitalia are of a very different form. The paramere lacks a postero-basal sensory patch of hairs and is a relatively simple, thumb-like structure, much more like that found in the genus *Kleiniella*. The form of the female ovipositor is unique among the known members of the tribe and suggests that *C. nigeriense* lays its eggs in an unusual site. A similarly modified ovipositor is found in *Psylla loranthi* Capener, 1973, and that author mentions that the long ovipositor enables the female of *P. loranthi* to penetrate the calyx of the *Loranthus* flower and deposit eggs on the style.

Ciriacremum angolense sp. n.

(Text-figs 37, 64, 91, 126–128)

Description. ♂. Medium size. Genae moderately developed (Text-fig. 37); antenna long, flagellum 4·19 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·2 : 1·5 : 1·7 : 1·9 : 0·5 : 0·2; ultimate rostral segment short, 0·36 times as long as third antennal segment and 1·40 times longer than tenth antennal segment. Fore wing ellipsoid, broad, 2·39 times longer than wide, spinule arrangement as in Text-fig. 64; *Cu* stem slightly more than twice as long as *M* + *Cu* stem; Cu_1 steeply parabolic and first cubital cell hardly longer than wide. Proctiger (Text-fig. 126) with simple basal part and a short narrow apical part; paramere (Text-figs 126, 127) compressed, on inner surface in upper half with a transverse subapical ridge and a number of strong downwardly directed setae, in basal part with a posterior lobe which bears a large group of short conical sensory pegs; distal segment of aedeagus as in Text-fig. 128; hypovalves (Text-fig. 126) short, narrow, with incurved apices.

♀. Unknown.

Measurements (±0·01 mm, based on 1 ♂). Maximum width of head, ♂ 0·95; length of antennal flagellum, ♂ 3·97; length of ultimate rostral segment, ♂ 0·16; length of fore wing, ♂ 3·16; maximum width of fore wing, ♂ 1·32; length of hind tibia, ♂ 0·71.

Host plant. Unknown; the single known specimen was collected at a light trap by a waterfall.

Holotype ♂, Angola: Cachoeiras, 20 mls [32 km] SW. Gabela, 18–19.iii.1972, at light (*BM Southern Africa Expedition*) (BMNH, London); slide mounted.

Discussion. The affinities of this species are obscure. It has a very distinctive fore wing shape and venation and the male genitalia are quite unlike any other known species in the genus. In particular the male paramere has retained the postero-basal sensory patch but the setae are modified to short, thick sense cones. The form of the distal segment of the aedeagus is similar to that found in *Ciriacremum capense* and *Kleiniella medleri*.

Ciriacremum capillicorne Enderlein, 1918 **comb. rev.**

Ciriacremum capillicorne Enderlein, 1918 : 483, figs D, E. Holotype ♂, Cameroun: 'Kamerun. Mitte Dezember' (? depository).
Bunoparia capillicornis (Enderlein) Enderlein, 1926 : 397.

Description. (Partly translated from original description and interpreted from original figures.) Genae and anterior margin of vertex whitish, anterior half of vertex black, posterior half dirty yellow. Median suture sharp. Eyes almost round, large, black. Antenna more than twice as long as body, very flimsy, with almost complete covering of very short hairs, dark brown, first three segments brown-black. Thorax red-brown, prothorax dark brown, sternum dirty yellow. Abdomen brown-black, dorsally without hairs, ventrally with moderately thick silver-white hairs, those of ninth sternite very short. First tergite with chitinous yellow cone-like hump. Subgenital plate (original fig. D) without hypovalves. Parameres unusually long and slender, dark brown, each one apically with an inwardly directed tooth-like spine. Basal part of proctiger with elongate triangular lateral expansions. Fore wing (original fig. E) hyaline, pterostigma short, *Cu* stem about twice as long as $M+Cu$ stem, Cu_1 steeply parabolic, first cubital cell slightly longer than wide.

Measurements (from original description). ♂, length of body, 3 mm; antenna 6·2 mm; fore wing length, 3 mm.

Host plant. Unknown.

Discussion. *C. capillicorne* is only known from the male holotype which could not be traced. From the original description and figures it is difficult to relate this species within the genus but it would appear to resemble *C. capense* as it lacks hypovalves, the basal part of the proctiger has triangular lateral expansions and the paramere is a relatively simple elongate conical structure without a postero-basal sensory patch. It apparently differs from *C. capense* in its very long antennae.

Ciriacremum capense Enderlein, 1923 **comb. rev.**

(Text-figs 47, 81, 132–134)

Ciriacremum capense Enderlein, 1923 : 543. Holotype ♀, South Africa: 'Süd-Afrika Capland, East London, Lightfoot, Juli 1914' (SAM, Cape Town).
Bunoparia capensis (Enderlein) Enderlein, 1926 : 397.
Bunoparia capensis (Enderlein); Capener, 1970*a* : 197.

Description. *Colouration.* Overall body colour mid brown with ochraceous and dark markings; pattern on dorsal surface of head and thorax very similar to *C. bicaudatum* (Text-

fig. 7); genae brown apically and ochraceous ventrally; proepisternum ochraceous, proepimeron dark brown, meso- and metapleurae dark brown; fore wing hyaline with brown patch proximal to point where claval suture joins hind margin; legs mainly ochraceous, femora sometimes darkened medially; abdomen brown dorsally, ochraceous ventrally.

Structure. ♂. Small species. Genal cones (Text-fig. 47) moderately well developed; antenna moderately long, flagellum 2·87–3·25 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·1 : 1·4 : 1·3 : 1·5 : 0·5 : 0·3; ultimate rostral segment short, 0·42–0·52 times as long as third antennal segment and 1·24–1·57 times longer than tenth antennal segment. Fore wing broadly ellipsoid, 2·25–2·37 times longer than wide, spinule arrangements as in Text-fig. 81; pterostigma short and broad; *Cu* stem about one and two-thirds longer than *M*+*Cu* stem; Cu_1 steeply parabolic and first cubital cell short, about one and one-third longer than wide. Proctiger (Text-fig. 132) with broad basal part which bears a pair of triangular lateral expansions, and a very short and narrow apical part; paramere (Text-figs 132, 133) thumb-like, on inner surface in apical half with a transverse subapical ridge which has a small tubercle at either end, and a few downwardly directed setae, basal part with a very poorly defined postero-basal group of setae; distal segment of aedeagus as in Text-fig. 134; subgenital plate (Text-fig. 132) without hypovalves.

♀. Slightly larger than ♂. Antennal flagellum 2·77–3·12 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·1 : 1·3 : 1·3 : 1·5 : 0·5 : 0·3; ultimate rostral segment 0·42–0·52 times as long as third antennal segment and 1·26–1·91 times longer than tenth antennal segment. Fore wing 2·24–2·41 times longer than wide. Ovipositor short, proctiger, 1·28–1·41 times longer than hind tibia.

Measurements (±0·01 mm, based on 7 ♂ and 6 ♀). Maximum width of head, ♂ 0·72–0·82, ♀ 0·78–0·90; length of antennal flagellum, ♂ 2·24–2·56, ♀ 2·43–2·80; length of ultimate rostral segment, ♂ 0·12–0·14, ♀ 0·13–0·15; length of fore wing, ♂ 2·06–2·44, ♀ 2·26–2·70; maximum width of fore wing, ♂ 0·89–1·08, ♀ 0·95–1·20; length of hind tibia, ♂ 0·49–0·57, ♀ 0·50–0·61; length of ♀ proctiger, 0·71–0·85.

Host plants. Restricted to native South African species of the genus *Schotia*: *S. speciosa* Jacqin, *S. latifolia* Jacqin and *S. brachypetala* Sonder.

Material examined.

South Africa: Transvaal, Boyne, 15–17.xii.1973; 6 ♂, 7 ♀, Pretoria, 5.iii.1964, *Schotia brachypetala* (*A. L. Capener*); 1 ♂, Kruger NP, Oliphants camp, 7.viii.1974, swept; 1 ♂, Skukusa, 8.viii.1974, swept (*B. R. Pitkin*); 1 ♂, 3 ♀, several larvae, Swaziland, Umbduzi R., 3.x.1967, *Schotia brachypetala* (*H. D. Catling*); 30 ♂, 30 ♀, several larvae, Natal (Zululand), Umfolozi GR, 25.viii.1971, *Schotia brachypetala* (*H. P. Insley*); 1 ♂, Cape Province, Mossel Bay, i. 1922; 1 ♂, Somerset East, ix. 1930; 3 ♀, Katberg, xii. 1932–ii. 1933 (*R. E. Turner*); 4 ♂, 4 ♀, van Stadens Pass, 27.x.1964, *Schotia latifolia*; 1 ♂, 1 ♀, Knysna, 18.x.1964; 1 ♂, Bathurst, 9.ii.1966; 1 ♂, 1 ♀, Port Alfred, 7.ii.1966 (*A. L. Capener*); 3 ♂, 2 ♀, several larvae, 31.i.1972, *Schotia afra* (*V. C. Moran*).

Discussion. *C. capense* is the only known species in the whole group to have extended into temperate southern Africa. It displays some distinctive features particularly with respect to wing venation and the male genitalia. The male subgenital plate lacks hypovalves, the paramere is a relatively simple structure and the proctiger has lateral expansions, similar to *Kleiniella* species. Furthermore the distal segment of the aedeagus is similar to that of *K. medleri*. The chorological, morphological and host plant evidence suggests that *C. capense* has been isolated from the bulk of *Ciriacremum* species for some time.

Ciriacremum funestum sp. n.

(Text-figs 46, 82, 92, 129–131)

DESCRIPTION. *Colouration.* Overall body colour green or ochraceous; fore wing hyaline.

Structure. ♂. Medium size. Genal cones poorly developed (Text-fig. 46); antennal flagellum moderately long, 2·81–3·07 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·6 : 2·0 : 0·6 : 0·4; ultimate rostral segment relatively long, 2·09–2·50 times longer than tenth antennal segment, third antennal segment 1·08–1·23 times longer than ultimate rostral segment. Fore wing relatively broad, 2·39–2·49 times longer than wide, pterostigma punctiformly sessile, strongly developed and causing the costa to bulge outwards, *Cu* stem about one and three-fifths longer than $M+Cu$ stem, Cu_1 steeply parabolic and first cubital cell hardly longer than wide, spinule arrangement as in Text-fig. 82. Proctiger (Text-fig. 129) with simple basal part and moderately long and narrow apical part; paramere (Text-figs 129, 130) laterally flattened with broad basal half, narrow apical half and a postero-basal lobe, inner surface with an apical tooth and a poorly developed medial sensory patch of hairs; distal segment of aedeagus as in Text-fig. 131; hypovalves (Text-fig. 129) simple, narrow, about as long as paramere.

♀. Antennal flagellum 2·59–2·98 times longer than width of head, relative lengths of segments from base to apex – 1·0 - 1·0 : 1·2 : 1·5 : 1·7 : 2·1 : 0·7 : 0·4; ultimate rostral segment 2·23–2·39 times longer than tenth antennal segment, third antennal segment 1·04–1·22 times longer than ultimate rostral segment. Fore wing 2·35–2·47 times longer than wide, costal bulge at pterostigma less developed than in ♂. Ovipositor relatively short, proctiger 1·47–1·56 times longer than hind tibia.

Measurements (±0·01 mm, based on 7 ♂ and 6 ♀). Maximum width of head, ♂ 0·78–0·86, ♀ 0·79–0·93; length of antennal flagellum, ♂ 2·32–2·43, ♀ 2·26–2·40; length of ultimate rostral segment, ♂ 0·21–0·25, ♀ 0·21–0·25; length of fore wing, ♂ 2·18–2·47, ♀ 2·17–2·61; maximum width of fore wing, ♂ 0·90–1·02, ♀ 0·89–1·09; length of hind tibia, ♂ 0·60–0·66, ♀ 0·58–0·66; length of ♀ proctiger, 0·87–1·02.

HOST PLANT. Unknown.

Holotype ♂, NIGERIA: SE. State, Ikom, 4.iv.1975 (*J. T. Medler*) (BMNH, London); dry mounted.

Paratypes. NIGERIA: 27 ♂, 20 ♀, same data as holotype; 3 ♂, 1 ♀, Oban, 7.iv.1975; 1 ♀, Obudu CR, 17.iii.1973; 1 ♂, 1 ♀, EC. State, Umuahia, 10.iv.1973 (*J. T. Medler*) (BMNH, London; NCI, Pretoria; and USNM, Washington); slide and dry mounted.

DISCUSSION. *C. funestum* sp. n. is an interesting species having characters common to both *Kleiniella* and *Ciriacremum*. It has the sessile pterostigma and long wing-vein hairs of *Kleiniella* but the short antennal hairs, grouped hind wing costal setae, grouped hind tibial spurs, and male hypovalves of *Ciriacremum*. The presence of these hypovalves indicates that this species belongs in the latter genus. The male paramere is most unusual in having a clearly developed postero-basal lobe, and the strongly developed pterostigma with a corresponding costal bulge is also remarkable.

Ciriacremum bicaudatum Enderlein, 1918 **comb. rev.**

(Text-figs 2, 6, 7, 9, 10, 14–18, 38, 67, 68, 138–141, 191)

Ciriacremum bicaudatum Enderlein, 1918 : 482, fig. C. Syntypes ♂ and ♀, TANZANIA: 'Deutsches Ost-Afrika, November' (? depository).

Bunoparia bicaudata (Enderlein) Enderlein, 1926 : 397.

DESCRIPTION. *Colouration.* Overall body colour brown with dark brown and ochraceous markings; dorsum of head and thorax with pattern as in Text-fig. 7; head dark brown ventrally;

proepisternum ochraceous, proepimeron dark brown, meso- and metapleurae dark brown; fore wing hyaline, rarely with brown infuscation distally, apices of veins brown, marginal cells with median apical brown spots; femora dark brown, ochraceous basally and apically; tibiae and basitarsi ochraceous, apical tarsal segments brown; abdomen red-brown dorsally, yellow laterally but with a red median longitudinal stripe, dark brown ventrally; ♂ proctiger brown basally and red apically, hypovalves dark brown; ovipositor dark brown.

Structure. ♂. Medium size. Genal cones moderately well developed (Text-fig. 38); antenna moderately long, flagellum 2·61–3·36 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·5 : 1·6 : 0·6 : 0·3; ultimate rostral segment short, 1·37–1·92 times longer than tenth antennal segment, third antennal segment 1·69–2·14 times longer than ultimate rostral segment. Fore wing ellipsoid, 2·44–2·65 times longer than wide, spinule arrangement as in Text-figs 67, 68; pterostigma long, *Cu* stem about twice as long as *M*+*Cu* stem, first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 138) with simple basal part and a very long narrow apical part; paramere (Text-figs 138–140) compressed, with broad basal part and a long narrow apical part, on inner surface with an apical tooth and a large postero-medial toothed ridge which bears a group of downwardly directed setae, ventral half bears a group of postero-ventrally directed setae; hypovalves long and broad (Text-figs 138, 139) with a poorly defined medial hump bearing a few barely modified setae, on inner posterior surface with a moderately developed vertical row of inwardly directed curved setae; distal segment of aedeagus (Text-fig. 141) with a narrow apex.

♀. Slightly larger than ♂. Antennal flagellum 2·78–3·03 times longer than head width, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·6 : 1·6 : 0·6 : 0·3; ultimate rostral segment 1·33–1·67 times longer than tenth antennal segment, third antennal segment 1·67–2·14 times longer than ultimate rostral segment. Fore wing 2·39–2·66 times longer than wide. Ovipositor relatively long (Text-fig. 191), proctiger 1·67–2·14 times longer than hind tibia.

Measurements (±0·01 mm, based on 14 ♂ and 8 ♀). Maximum width of head, ♂ 0·72–0·94, ♀ 0·82–0·94; length of antennal flagellum, ♂ 2·30–2·78, ♀ 2·33–2·80; length of ultimate rostral segment, ♂ 0·14–0·18, ♀ 0·14–0·16; length of fore wing, ♂ 2·60–3·10, ♀ 2·82–3·25; maximum width of fore wing, ♂ 0·99–1·20, ♀ 1·12–1·31; length of hind tibia, ♀ 0·65–0·75, ♀ 0·67–0·75; length of ♀ proctiger, 1·29–1·56.

HOST PLANT. Unknown.

MATERIAL EXAMINED.

NIGERIA: EC. State, Umuahia, 1.iv.1973 (*J. T. Medler*). ZAIRE: 10 ♂, 16 ♀, Kivu, Kavimvira (Uvira), xii. 1954, at light (*G. Marlier*); 1 ♂, Elizabethville, 1953–1955, at light; 1 ♂, 1 ♀, xi. 1959, at light (*Ch. Seydel*). ANGOLA: 2 ♂, 1 ♀, Salazar, 29.xi.1972, at light; 1 ♀, viii. 1973; 1 ♀, Cela, 27.viii.1973; 11 ♂, 11 ♀, Chianga, 17.x.1972, at light; 1 ♂, 26.viii.1974, at light (*J. Passos de Carvalho*); 3 ♂, 8.ix.1963, at light (*H. Cardosa*); 2 ♀, 15–19.ix.1970, yellow trays (*A. van Harten*); 1 ♀, Tundavala, 13–16 km NW. Sa da Bandeira, 27–29.iii.1972, general sweeping (*BM Southern Africa Expedition*). MOZAMBIQUE: 2 ♂, 1 ♀, Chibuto, 29.ix.1968, on Cashew.

DISCUSSION. *C. bicaudatum* and the following eight species present a very interesting species-group. A study of the biology and systematics of the group could give some useful information to refine species concepts and understand mechanisms of speciation in tropical psyllids.

C. bicaudatum, as it is understood here, is a widespread and morphologically variable species. Its geographic range extends from southern Nigeria, through Zaire and Central Africa to Mozambique. The populations examined from either

end of this range differ from much of the Central African material in that the fore wing has a more even covering of spinules on the dorsal surface (Text-figs 67, 68). Also, in the Nigerian specimens, the seventh and eighth antennal segments are relatively longer, the relative lengths of the flagellar segments being, in the ♂ – 1·0 : 1·0 ; 1·2 : 1·6 : 1·9 : 2·3 : 0·6 : 0·4, and in the ♀ – 1·0 : 1·0 : 1·2 : 1·6 : 1·7 : 2·0 : 0·6 : 0·4. The male genitalia are also subject to slight variation, particularly in the length of the hypovalves (Text-figs 138, 139).

The other eight species in the group occur both allopatrically and sympatrically with *C. bicaudatum*. *C. daubicatum* sp. n. from Ghana and *C. cabudiatum* sp. n. from the Ivory Coast would appear to be westward replacement species of *bicaudatum*, and *C. capeneri* sp. n. from Rhodesia may be a southern replacement, although *C. bicaudatum* is known from southern coastal Mozambique. *C. harteni* sp. n. *C. carvalhoi* sp. n., *C. julbernardioides* sp. n. and *C. orientale* sp. n. are sympatric with *C. bicaudatum* in *Brachystegia* woodland but may occur on different host plants. For instance *C. carvalhoi* feeds on *Hymenostegia laxiflora*, *C. julbernardioides* on species of *Julbernardia*, and *C. harteni* is found on *Brachystegia spiciformis* and *B. tamarindoides*. This point will only be verified when the host of *C. bicaudatum* is known.

The male genitalia of the *bicaudatum*-group conform to a basic plan but show modifications in different structures which reflect the various lines of evolution within the group. Taking *C. bicaudatum* as a starting point, but not necessarily suggesting this species displays the primitive condition for all attributes concerned, one can trace these patterns of radiation. In *C. bicaudatum* the paramere (Text-fig. 140) has an elongate apical part and a moderately well developed postero-medial tubercle and sensory patch of setae; the hypovalves (Text-figs 138, 139) are long, broad and paired, with a slight medial hump bearing relatively undifferentiated setae, and the inner postero-vertical setae are moderately developed. The simplest development of the state is found in *C. cabudiatum* sp. n. where the apical lobe of the paramere is shortened, the postero-medial tubercle and sensory patch are slightly more developed (Text-fig. 148); and on the hypovalves (Text-fig. 147) the medial hump is a little more developed with slightly more differentiated setae, and the inner postero-vertical row of setae is very much more developed. *C. daubicatum* represents a more derived condition along this line as the hypovalves have become elongate and slender, the medial hump is well developed and bears strongly differentiated setae, and the postero-vertical row of setae is very well developed (Text-figs 142, 143). In *C. carvalhoi* the thinner apical part of the hypovalve is lost but the specialized setae are retained in a subapical position (Text-fig. 161); in *C. harteni* the specialized setae are replaced by a tubercle (Text-fig. 165); and in *C. capeneri* the hypovalves have fused distally to form a single posterior structure (Text-figs 168, 170) with each half bearing a group of specialized setae on a tubercle.

C. tubacadium has evolved along a different line. In this species the hypovalves have a less developed postero-vertical row of setae but on the paramere the apical lobe is reduced and the postero-medial sensory patch of setae is extended vertically along the inner posterior margin so forming an equivalent setal arrangement to the hypovalves of *C. bicaudatum* (Text-figs 150, 151).

C. julbernardioides and *C. orientale* have similar paramere and hypovalve structures to *C. bicaudatum* but the apical part of the proctiger is reduced. These two species have heavily spinuled fore wings (Text-figs 75, 76), quite unlike any other Ethiopian species, and apparently breed on *Julbernardia* species rather than *Brachystegia*.

Ciriacremum daubicatum sp. n.

(Text-figs 39, 69, 142–145)

Description. ♂. Very similar to *C. bicaudatum*. Antennal flagellum 3·00–3·12 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·6 : 1·8 : 0·6 : 0·3; ultimate rostral segment 1·65 times longer than tenth antennal segment, third antennal segment 1·74–1·94 times longer than ultimate rostral segment. Fore wing 2·52–2·66 times longer than wide, spinule arrangement as in Text-fig. 69; pterostigma long; *Cu* stem about two and a quarter times longer than *M* + *Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 142) with simple basal part and a very long and narrow apical part; paramere (Text-figs 142, 144) compressed, with broad basal part and moderately long and narrow apical part, on inner surface with an apical toothed ridge and well developed postero-medial toothed ridge and sensory patch of strongly developed setae, postero-basal patch of backwardly directed hairs moderately developed; hypovalves (Text-fig. 143) elongate, apical part hardly wider than apical part of proctiger, medial hump well developed and bearing four to five strongly developed curved setae, inner postero-vertical row of curved setae well developed; distal segment of aedeagus (Text-fig. 145) with narrow apex.

♀. Slightly larger than ♂. Ultimate rostral segment 1·60–1·77 times longer than tenth antennal segment, third antennal segment 1·67–1·87 times longer than ultimate rostral segment. Fore wing 2·5–2·6 times longer than wide. Ovipositor shorter than in *C. bicaudatum*, proctiger 1·68–1·79 times longer than hind tibia.

Measurements (±0·01 mm, based on 4 ♂ and 6 ♀). Maximum width of head, ♂ 0·84–0·92, ♀ 0·83–0·95; length of antennal flagellum, ♂ 2·52–2·74, ♀ 2·50–2·90; length of ultimate rostral segment, ♂ 0·16–0·17, ♀ 0·16–0·18; length of fore wing, ♂ 2·80–3·36, ♀ 2·97–3·34; maximum width of fore wing, ♂ 1·11–1·27, ♀ 1·17–1·33; length of hind tibia, ♂ 0·70–0·83, ♀ 0·70–0·79; length of ♀ proctiger, 1·23–1·37.

Host plant. Unknown; all specimens examined were collected at light.

Holotype ♂, Ghana: Tafo, Cocoa Res. Inst., ix. 1973, light trap (*M. A. K. Akotoye*) (BMNH, London); slide mounted.

Paratypes. Ghana: 3 ♂, 6 ♀, same data and depository as holotype; all slide mounted.

For discussion of this species see under *C. bicaudatum* (p. 38).

Ciriacremum cabudiatum sp. n.

(Text-figs 40, 70, 146–149)

Description. *Colouration*. Overall body colour similar to *C. bicaudatum* but pattern less well developed.

Structure. ♂. Similar to *C. bicaudatum*. Genal cones slightly more strongly developed (Text-fig. 40); antennal flagellum 3·11–3·35 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·6 : 1·6 : 1·9 : 0·6 : 0·3; ultimate rostral segment very short, 1·22–1·29 times longer than tenth antennal segment, third antennal

segment 2·38—2·75 times longer than ultimate rostral segment. Fore wing 2·45–2·51 times longer than wide, spinule arrangement as in Text-fig. 70; pterostigma shorter than in *C. bicaudatum*; *Cu* stem slightly more than twice as long as *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 146) with simple basal part and a long and narrow apical part; paramere (Text-figs 146, 148) compressed, narrow apical part considerably shorter than in *C. bicaudatum*, on inner surface with an apical toothed ridge and well developed postero-medial toothed ridge and sensory patch of setae, basal part with poorly defined postero-basal sensory patch of hairs; hypovalves (Text-figs 146, 147) with moderately well developed medial hump which bears moderately differentiated setae, and a well developed inner postero-vertical row of curved setae; distal segment of aedeagus (Text-fig. 149) with broad apex.

♀. Slightly larger than ♂. Antennal flagellum 3·01–3·12 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·6 : 1·7 : 1·8 : 0·6 : 0·3; ultimate rostral segment 1·23–1·26 times longer than tenth antennal segment, third antennal segment 2·31–2·58 times longer than ultimate rostral segment. Fore wing 2·40–2·49 times longer than wide. Ovipositor relatively short, proctiger 1·38–1·40 times longer than hind tibia.

Measurements (±0·01 mm, based on 5 ♂ and 3 ♀). Maximum width of head, ♂ 0·85–0·93, ♀ 0·92–0·94; length of antennal flagellum, ♂ 2·65–2·98, ♀ 2·82–2·88; length of ultimate rostral segment, ♂ 0·12–0·13, ♀ 0·12–0·13; length of fore wing, ♂ 2·80–2·94, ♀ 3·09–3·25; maximum width of fore wing, ♂ 1·13–1·19, ♀ 1·25–1·33; length of hind tibia, ♂ 0·66–0·75, ♀ 0·70–0·75; length of ♀ proctiger, 0·96–1·03.

HOST PLANT. Unknown.

Holotype ♂, IVORY COAST: Bingerville, ix. 1962 (*J. Decelle*) (MRAC, Tervuren); dry mounted.

Paratypes. IVORY COAST: 7 ♂, 8 ♀, same data as holotype. NIGERIA: 1 ♂, 1 ♀, SE. State, Ikom, 4.iv.1975 (*J. T. Medler*) (MRAC, Tervuren; BMNH, London); slide and dry mounted.

For discussion of this species see under *C. bicaudatum* (p. 38).

Ciriacremum carvalhoi sp. n.

(Text-figs 44, 73, 160–163)

DESCRIPTION. *Colouration*. Overall body colour ochraceous-green with light or dark brown markings; apices of genal cones red-brown; mesopraescutum with a pair of brown patches antero-medially; mesoscutum with two pairs of broad longitudinal brown bands; fore wing hyaline with a small brown spot proximal to point where claval suture joins hind margin; fore and mid femora dark brown ventrally; abdomen with median longitudinal dorsal brown stripe, proctiger with broad brown spot dorsally near junction between basal and apical parts.

Structure. ♂. Similar to *C. bicaudatum*. Genal cones (Text-fig. 44) well developed; antennal flagellum 2·81–3·14 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·6 : 1·8 : 0·6 : 0·3; ultimate rostral segment relatively short, 1·05–1·42 times longer than tenth antennal segment, third antennal segment 2·18–2·82 times longer than ultimate rostral segment. Fore wing 2·40–2·58 times longer than wide, spinule arrangement as in Text-fig. 73; pterostigma relatively short, *Cu* stem about one and one-third longer than *M*+*Cu* stem; first cubital cell about one and one-third longer than wide. Proctiger (Text-fig. 160) with simple basal part and moderately long and narrow apical part; paramere (Text-figs 160, 162) compressed, with short narrow apical part, inner surface with an apical toothed ridge, a moderately well developed postero-medial toothed ridge and sensory patch of well developed setae, basal part with moderately well defined postero-basal sensory patch of setae; hypovalves (Text-figs 161) relatively short, with a subapical group of

four to six differentiated setae, postero-vertical row of curved setae moderately developed; distal segment of aedeagus (Text-fig. 163) with narrow apex.

♀. Slightly larger than ♂. Antennal flagellum 2·89–3·07 times longer than width of head, relative lengths of flagellar segments from base to apex – as in ♂; ultimate rostral segment 1·12–1·21 times longer than tenth antennal segment, third antennal segment 2·25–2·54 times longer than ultimate rostral segment. Fore wing 2·35–2·49 times longer than wide. Ovipositor relatively long, proctiger 1·83–1·98 times longer than hind tibia.

Measurements (±0·01 mm, based on 9 ♂ and 5 ♀). Maximum width of head, ♂ 0·77–0·87, ♀ 0·79–0·85; length of antennal flagellum, ♂ 2·16–2·71, ♀ 2·29.2·53; length of ultimate rostral segment, ♂ 0·01–0·12, ♀ 0·10–0·11; length of fore wing, ♂ 2·34–2·73, ♀ 2·54–2·83; maximum width of fore wing, ♂ 0·92–1·11, ♀ 1·02–1·18; length of hind tibia, ♂ 0·52–0·60, ♀ 0·54–0·60; length of ♀ proctiger, 1·06–1·14.

Host plant. Type-series collected from young seedlings of *Hymenostegia laxiflora* (Bentham) Harms in an old coffee forest that was reverting to the wild state.

Holotype ♂, Angola: Salazar, I.I.A.A., 9–15.iii.1972, *Hymenostegia laxiflora* (*BM Southern Africa Expedition*) (BMNH, London); dry mounted.

Paratypes. Angola: 27 ♂, 15 ♀, same data as holotype; 1 ♂, 2 ♀, at light (*BM Southern Africa Expedition*); 1 ♀, 22.ix.1972, light trap (*J. Passos de Carvalho*); 1 ♀, 5 km SW Salazar, 15.iii.1972, at light (*BM Southern Africa Expedition*). Nigeria: 1 ♂, Ile–Ife, 25.iii.1969; 1 ♂, 28.ii.1970; 1 ♀, MW. State, Benin, 20.iii.1972; 1 ♂, 1 ♀, 1.iv.1975; 2 ♂, 8.iv.1973; 2 ♀, nr Siluko, iii. 1973 (*J. T. Medler*); 1 ♂, 1 ♀, Sapoba FR, nr Benin, 10–12.iii.1972 (*E. W. Classey*). Ghana: 1 ♂, 1 ♀, Tafo (*B. M. Gerrard*). (BMNH, London; MRAC, Tervuren; and ZI, Leningrad); slide and dry mounted.

Discussion. (See also under *C. bicaudatum*, p. 38). *C. carvalhoi* is closely related to the following two species, forming with them a well defined subgroup within the *bicaudatum*-group. All three species show similar modifications of the male hypovalves (Text-figs 161, 165, 170) from the *bicaudatum*-type.

Ciriacremum harteni sp. n.

(Text-figs 24, 42, 72, 164–167)

Description. *Colouration.* Similar to *C. bicaudatum*. Femora and tarsal segments yellow; apical part of ♂ proctiger light brown.

Structure. ♂. Similar to *C. bicaudatum*. Genal cones less well developed (Text-fig. 42); antenna shorter, flagellum 1·91–2·23 times longer than width of head, relative lengths of flagellar segment from base to apex – 1·0 : 0·9 : 1·0 : 1·1 : 1·2 : 1·1 : 0·5 : 0·5; ultimate rostral segment relatively longer, 1·84–2·14 times longer than tenth antennal segment, third antennal segment 1·06–1·19 times longer than ultimate rostral segment. Fore wing slightly broader, 2·28–2·56 times longer than wide, spinule arrangement as in Text-fig. 72; pterostigma short; *Cu* stem slightly less than twice as long as *M*+*Cu* stem; first cubital cell one and one-quarter times longer than wide. Proctiger (Text-fig. 164) with relatively short apical part; paramere (Text-figs 164, 166) compressed, with long broad basal part and short narrow apical part, inner surface with an inner toothed ridge and a moderately developed postero-medial lobe, postero-medial and postero-basal sensory patches of hairs relatively undifferentiated; hypovalves (Text-fig. 165) similar to *C. carvalhoi* sp. n. but with a subapical tubercle; distal segment of aedeagus (Text-fig. 167) relatively short with a broad apex.

♀. Slightly larger than ♂. Antennal flagellum 1·91–2·19 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 0·9 : 1·0 : 1·1 : 1·1 : 0·5 : 0·4; ultimate rostral segment 1·74–2·26 times longer than tenth antennal segment, third antennal segment 1·05–1·25 times longer than ultimate rostral segment. Fore wing 2·26–2·40 times longer than wide. Ovipositor shorter than in *C. bicaudatum*, proctiger 1·32–1·40 times longer than hind tibia.

Measurements (±0·01 mm, based on 8 ♂ and 8 ♀). Maximum width of head, ♂ 0·63–0·68, ♀ 0·66–0·75; length of antennal flagellum, ♂ 1·25–1·40, ♀ 1·34–1·57; length of ultimate rostral segment, ♂ 0·16–0·18, ♀ 0·16–0·20; Length of fore wing, ♂ 1·91–2·05, ♀ 2·06–2·45; maximum width of fore wing, ♂ 0·77–0·87, ♀ 0·88–1·06; length of hind tibia, ♂ 0·52–0·58, ♀ 0·55–0·64; length of ♀ proctiger, 0·77–0·87.

HOST PLANTS. Adults and larvae have been taken from *Brachystegia spiciformis* Bentham and *B. tamarindoides* Welwitsch ex Bentham.

Holotype ♂, ANGOLA: Chianga, 21–24.iii.1972, *Brachystegia tamarindoides* (*BM Southern Africa Expedition*) (BMNH, London); dry mounted.

Paratypes. ANGOLA: 20 ♂, 13 ♀, same data as holotype; 1 ♀, vi. 1970, yellow tray; 10 ♂, 14 ♀, 5–14.ix.1970, yellow tray; 5 ♂, 5 ♀, x. 1970, yellow tray; 2 ♂, xii. 1970–i. 1971; 4 ♂, 14 ♀, 31.viii.1970, *Brachystegia spiciformis*; 4 ♂, 2 ♀, several larvae, 10.x.1970; 6 ♂, 2 ♀, several larvae, Catata, 17.ii.1972, *Brachystegia tamarindoides* (*A. van Harten*); 2 ♂, 4 ♀, Tundavala, 9 mls [14.5 km] NW. Sa da Bandeira, 23.ii.1972, *Brachystegia spiciformis*; 2 ♀, 15 mls [24 km] N. Sa da Banderia, *c.* 6500′ [1981 m], 3.iii.1972, *Brachystegia spiciformis* (*BM Southern Africa Expedition*) (BMNH, London; MRAC, Tervuren; NCI, Pretoria); slide and dry mounted.

DISCUSSION. (See also under *C. bicaudatum*, p. 38). In *C. harteni* the male hypovalves are very similar to *C. carvalhoi* but the subapical setae are replaced by a small tubercle; also the inner postero-vertical row of curved setae is more strongly developed. The paramere has undergone considerable change with the postero-medial tubercle and sensory patch relatively undifferentiated. The aedeagus is unlike any other species in the *bicaudatum* group, the distal segment being short and thick.

Ciriacremum capeneri sp. n.

(Text-figs 27, 43, 74, 168–171)

DESCRIPTION. *Colouration*. Overall body colour and pattern similar to *C. bicaudatum*; genae completely ochraceous; femora not darkened; apical part of ♂ proctiger brown.

Structure. ♂. Similar to *C. bicaudatum*. Genal cones (Text-fig. 43) less well developed; antennal flagellum 1·82–2·40 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 - 1·2 : 1·5 : 1·4 : 1·3 : 0·6 : 0·4; ultimate rostral segment 1·35–2·03 times longer than tenth antennal segment, third antennal segment 1·17–1·61 times longer than ultimate rostral segment. Fore wing 2·47–2·68 times longer than wide, spinule arrangement as in Text-fig. 74; pterostigma long; *Cu* stem about two and a half times longer than *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 168) with simple basal part and relatively short narrow apical part; paramere (Text-figs 168, 169) compressed, with moderately long and narrow apical part, on inner surface with apical tooth, a well developed medial toothed ridge and moderately well developed sensory patch of setae, basal part with a poorly defined sensory patch of hairs; distal segment of

aedeagus (Text-fig. 171) with broad apex; subgenital plate (Text-fig. 170) with short hypovalves which are fused along their inner apical surfaces to form a single structure or hypovalvular plate, a subapical tubercle with a few short setae is present on either half of this plate on the dorsal surface, ventro-medially the inner vertical rows of curved setae are developed up to the point where the hypovalves are fused.

♀. Slightly larger than ♂. Antennal flagellum 1·97–2·18 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·4 : 1·4 : 0·7 : 0·5; ultimate rostral segment 1·49–1·86 times longer than tenth antennal segment, third antennal segment 1·21–1·42 times longer than ultimate rostral segment. Fore wing 2·36–2·69 times longer than wide. Ovipositor of moderate length, proctiger 1·56–1·69 times longer than hind tibia.

Measurements (±0·01 mm, based on 12 ♂ and 5 ♀). Maximum width of head, ♂ 0·64–0·80, ♀ 0·70–0·83; length of antennal flagellum, ♂ 1·17–1·74, ♀ 1·38–1·74; length of ultimate rostral segment, ♂ 0·12–0·16, ♀ 0·12–0·15; length of fore wing, ♂ 1·81–2·50, ♀ 1·96–2·64; maximum width of fore wing, ♂ 0·72–0·97, ♀ 0·83–1·05; length of hind tibia, ♂ 0·42–0·58, ♀ 0·43–0·57; length of ♀ proctiger, 0·67–0·90.

Host plant. *Brachystegia glaucescens* Burtt Davy & Hutchinson.

Holotype ♂, Rhodesia: Rusape, vii. 1970, *Brachystegia glaucescens* (*J. McDaniel*) (NCI, Pretoria); slide mounted.

Paratypes. Rhodesia: 24 ♂, 13 ♀, several larvae, same data as holotype; 1 ♀, Salisbury, 6.vi.1958 (*C. E. Taylor*); 29 ♂, 38 ♀, 1967/1968, sticky traps (*J. R. Blowers*); 7 ♂, 3 ♀, Enterprise, 20.x.1960, on weeds in streak field-maize (*Dept. Agric.*). Tanzania: 1 ♀, Nachingwea, x. 1953–ii. 1954, yellow tray (*V. F. Eastop*); 1 ♂, no data (probably Kenya) (BMNH, London; NCI, Pretoria); slide mounted and in 80% ethanol.

Discussion. (See also under *C. bicaudatum*, p. 38.) *C. capeneri* is unlike any other species in the genus in that the male hypovalves are fused apically to form a single structure. On the general form of the male genitalia this species is clearly a member of the *bicaudatum* group and probably the most derived species of the subgroup including *C. carvalhoi* and *C. harteni*.

Ciriacremum tubacadium sp. n.

(Text-figs 41, 71, 150–152)

Description. ♂. Very similar to *C. bicaudatum*. Antennal flagellum 2·86–3·12 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·1 : 1·2 : 1·6 : 1·7 : 1·7 : 0·7 : 0·4; ultimate rostral segment 1·52–1·58 times longer than tenth antennal segment, third antennal segment 1·71–1·92 times longer than ultimate rostral segment. Fore wing 2·55–2·72 times longer than wide, spinule arrangement as in Text-fig. 71; pterostigma long; *Cu* stem about twice as long as *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 150) with simple basal part and a long narrow apical part; paramere (Text-figs 150, 151) compressed with truncate apex, inner surface with apical tubercle, postero-medial tubercle moderately well developed, postero-medial sensory patch of setae extended vertically along inner margin of paramere, postero-lateral sensory patch of setae moderately well developed; distal segment of aedeagus (Text-fig. 152) with narrow apex.

♀. Slightly larger than ♂. Antennal flagellum 2·88–2·99 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·3 : 1·6 : 1·7 : 1·8 : 0·7 : 0·4: ultimate rostral segment 1·40–1·58 times longer than tenth antennal segment, third antennal

segment 1·36–2·08 times longer than ultimate rostral segment. Fore wing 2·45–2·77 times longer than wide. Ovipositor relatively long, proctiger 2·05–2·18 times longer than hind tibia.

Measurements (±0·01 mm, based on 6 ♂ and 5 ♀). Maximum width of head, ♂ 0·71–0·77, ♀ 0·68–0·90; length of antennal flagellum, ♂ 2·17–2·31, ♀ 2·03–2·34; length of ultimate rostral segment, ♂ 0·13–0·14, ♀ 0·13–0·17; length of fore wing, ♂ 2·63–2·94, ♀ 2·50–3·16; maximum width of fore wing, ♂ 1·03–1·13, ♀ 0·96–1·24; length of hind tibia, ♂ 0·60–0·65, ♀ 0·54–0·71; length of ♀ proctiger, 1·14–1·45.

Host plant. Unknown; type-series collected at light.

Holotype ♂, Angola: Dundo, 10–13.viii.1953, light trap (*Luna*) (BMNH, London); slide mounted.

Paratypes. Angola: 5 ♂, 4 ♀, same data and depository as holotype; slide mounted.

Discussion. (See also under *C. bicaudatum*, p. 38.) *C. tubacadium* is unlike any other species in the *bicaudatum*-group because the vertical row of curved setae on the inner margins of the male hypovalves are much reduced and apparently replaced by the postero-medial sensory setae of the parameres which have become extended vertically along the inner posterior margin of each paramere.

Ciriacremum julbernardioides sp. n.

(Text-figs 21, 25, 45, 75, 153–156)

Description. *Colouration.* Overall body colour light brown with ochraceous markings; dorsum of head and thorax with pattern similar to *C. bicaudatum* but not so obvious because the ground colour is much lighter; fore wing with yellowish tinge due to heavy density of spinules, sometimes distal hind margin infuscate; legs ochraceous.

Structure. ♀. Smaller than *C. bicaudatum*. Antennal flagellum relatively short, 1·61–2·15 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·2 : 1·1 : 1·1 : 0·6 : 0·5; ultimate rostral segment 1·6–1·9 times longer than tenth antennal segment, third antennal segment 1·07–1·31 times longer than ultimate rostral segment. Fore wing relatively broad, 2·21–2·39 times longer than wide, evenly and densely covered with spinules on dorsal surface (Text-fig. 75); pterostigma long; length of *Cu* stem variable, from 1·7–2·4 times longer than *M*+*Cu* stem; first cubital cell about one and a quarter times longer than wide. Proctiger (Text-fig. 153) with simple basal part and relatively short and narrow apical part; paramere (Text-figs 153, 155) compressed, with long narrow apical part and broad basal part, on inner surface with a moderately developed apical ridge, a well developed postero-medial toothed ridge and sensory patch of setae, postero-basal sensory patch of hairs moderately well developed; distal part of aedeagus (Text-fig. 156) with broad apex; hypovalves (Text-fig. 154) shorter than in *C. bicaudatum* with inner postero-vertical row of setae developed only in basal half.

♀. Slightly larger than ♂. Antennal flagellum 1·77–2·21 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·2 : 1·1 : 1·0 : 0·5 : 0·4; ultimate rostral segment 1·6–1·8 times longer than tenth antennal segment, third antennal segment 1·06–1·44 times longer than ultimate rostral segment. Fore wing 2·18–2·37 times longer than wide. Ovipositor relatively short, proctiger 1·14–1·31 times longer than hind tibia.

Measurements (±0·01 mm, based on 15 ♂ and 10 ♀). Maximum width of head, ♂ 0·69–0·79, ♀ 0·77–0·83; length of antennal flagellum, ♂ 1·14–1·62, ♀ 1·36–1·79; length of ultimate rostral segment, ♂ 0·15–0·18, ♀ 0·16–0·18; length of fore wing, ♂ 2·05–2·54, ♀ 2·45–2·82; maximum width of fore wing, ♂ 0·89–1·13, ♀ 1·05–1·29; length of hind tibia, ♂ 0·52–0·66, ♀ 0·59–0·69; length of ♀ proctiger, 0·71–0·87.

Host plants. Larvae and adults have been collected from *Julbernardia paniculata* (Bentham) Troupin, and *J. globiflora* (Bentham) Troupin. Adults only have been collected from *Brachystegia spiciformis* Bentham.

Holotype ♂, Angola: Tundavala, 9 mls [15 km] NW. Sa da Bandeira, 23.ii.1972, beaten from *Brachystegia spiciformis* (*BM Southern Africa Expedition*) (BMNH, London); dry mounted.

Paratypes. Angola: 11 ♂, 7 ♀, same data as holotype; 1 ♂, 1 ♀, 27–29.iii.1972, general sweeping; 1 ♂, 1 ♀, 15 mls [24 km] N. Sa da Bandeira, *c.* 6500′ [1981 m], 24.ii.1972, *Brachystegia* woodland; 3 ♂, 1 ♀, 3.iii.1972, *Brachystegia spiciformis* (*BM Southern Africa Expedition*); 2 ♂, 3 ♀, Chianga, 7–9.ix.1966, at light; 3 ♂, 5 ♀, several larvae, 15.ix.1970, *Julbernardia paniculata*; 1 ♂, 15–19.ix.1970, yellow tray (*A. van Harten*); 30 ♂, 43 ♀, 17.x.1972, at light; 1 ♂, 2 ♀, Cela, x. 1972, at light; 1 ♂, 27.iii.1973 (*J. Passos de Carvalho*); 6 ♂, 6 ♀, Ceilunga, 8.x.1972, at light (*M. Umbelina*); 3 ♂, 1 ♀, several larvae, Nharea, 6.x.1974, *Julbernardia paniculata* (*A. van Harten*). Zaire: 1 ♂, 3 ♀, Elizabethville, 17.x.1923 (*Ch. Seydel*). Rhodesia: 1 ♂, 1 larva, Salisbury, 12.i.1958, lucerne, bred on peas; 1 ♂, 18–19.x.1958, yellow trays; 1 ♂, xi. 1958, yellow tray; 3 ♂, 1 ♀, v. 1959, yellow tray (*C. E. Taylor*); 6 ♂, 6 ♀, several larvae, i. 1968, *Julbernardia globiflora* (*J. R. Blowers*) (BMNH, London; MRAC, Tervuren; NCI, Pretoria; ZI, Leningrad); slide and dry mounted, and stored in 80% ethanol.

Discussion. (See also under *C. bicaudatum*, p. 38.) *C. julbernardioides* is closely related to the following species and the two are regarded here as sister species. On the structure of the male genitalia they are obviously members of the *bicaudatum*-group but both are easily distinguished because the membrane of the fore wing is evenly and densely covered with spinules on the dorsal surface.

Ciriacremum orientale sp. n.

(Text-figs 21, 76, 157–159)

Description. ♂. Very similar to *C. julbernardioides*. Antennal flagellum shorter, 1·27–1·43 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·8 : 0·9 : 1·0 : 0·9 : 0·9 : 0·5 : 0·4; ultimate rostral segment 1·87–2·50 times longer than tenth antennal segment, third antennal segment 0·93–1·00 times longer than ultimate rostral segment. Fore wing 2·12–2·27 times longer than wide. Proctiger (Text-fig. 157) with shorter narrow apical part; paramere (Text-figs 157, 158) with short narrow apical part and less well developed postero-medial ridge; distal segment of aedeagus (Text-fig. 159) with narrower apex; hypovalves relatively shorter, with inner postero-vertical row of setae not at all developed.

♀. Slightly larger than ♂. Antennal flagellum 1·23–1·36 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·8 : 0·9 : 0·9 : 1·0 : 0·9 : 0·6 : 0·6; ultimate rostral segment 1·50–1·75 times longer than tenth antennal segment, third antennal segment 1·0–1·14 times longer than ultimate rostral segment. Fore wing 2·13–2·29 times longer than wide. Ovipositor shorter than in *C. julbernardioides*, proctiger 1·00–1·22 times longer than hind tibia.

Measurements (±0·01 mm, based on 8 ♂ and 6 ♀). Maximum width of head, ♂ 0·67–0·73, ♀ 0·78–0·80; length of antennal flagellum, ♂ 0·85–1·00, ♀ 0·96–1·07; length of ultimate rostral segment, ♂ 0·15–0·17, ♀ 0·14; length of fore wing, ♂ 1·80–2·16, ♀ 2·34–2·57; maximum width of fore wing ♂ 0·80–0·98, ♀ 1·06–1·19; length of hind tibia, ♂ 0·52–0·62, ♀ 0·55–0·59; length of ♀ proctiger, 0·59–0·71.

Host plant. Unknown.

Holotype ♂, Tanzania: Nachingwea, x. 1953–ii. 1954, yellow tray (*V. F. Eastop*) (BMNH, London); slide mounted.

Paratypes. Tanzania: 5 ♂, 2 ♀, same data as holotype. East Africa [Kenya coast]: 2 ♂, Myombo [Swahili for *Brachystegia* woodland], 13.iii.1914. Mozambique: 4 ♀, 9 mls [14·5 km] NW. Dondo, 11.xi.1967 (*H. D. Brown*) (BMNH, London; NCI, Pretoria); all slide mounted.

Discussion. The genetic relationship between *C. julbernardioides* and *C. orientale* presents an interesting problem at the species level that cannot be clearly resolved without further information on the biology and distribution of these two so-called species.

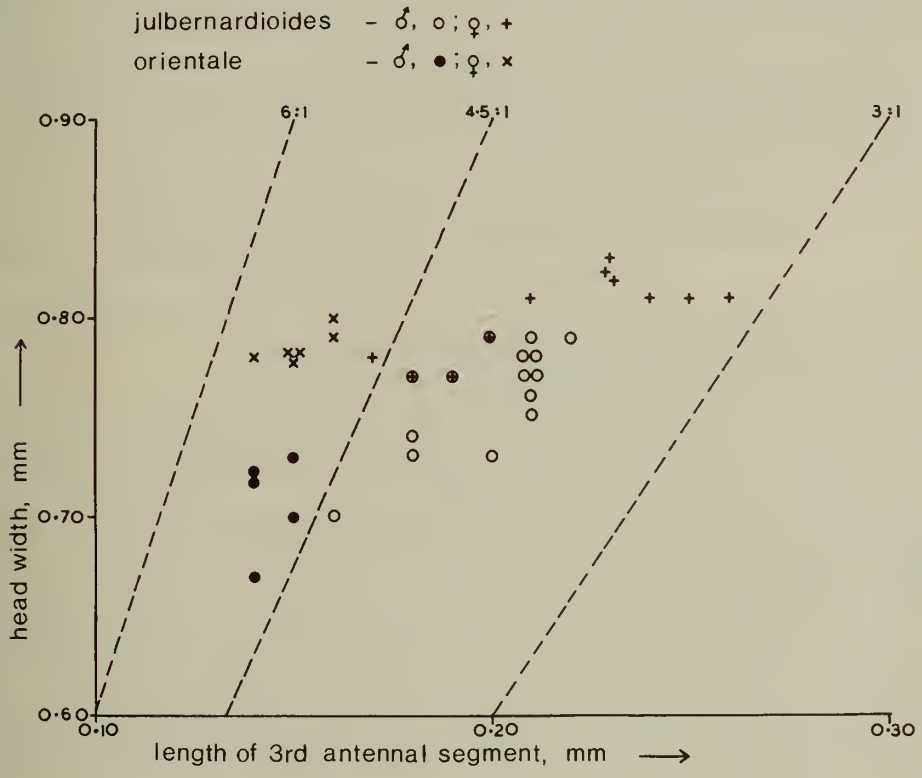


Fig. 21. Scatter diagram comparing head width against length of third antennal segment in *Ciriacremum julbernardioides* and *C. orientale*.

It is suggested here that *C. julbernardioides* and *C. orientale* form a sister pair of species separable, morphologically, on the structure of the male genitalia (Text-figs 153–159) and on the relative proportions of the antennal flagellum to head width (Text-fig. 21). *C. julbernardioides* is a widespread species occurring from southern Mozambique, through Rhodesia to southern and central Angola, apparently breeding

on trees of the genus *Julbernardia*. *C. orientale* is restricted to the coastal areas of *Brachystegia* woodland in East Africa. The host plant of *C. orientale* is not known, the species being described from a small series of both sexes trapped in yellow trays at Nachingwea (southern Tanzania), and two males labelled 'Myombo [Swahili for *Brachystegia* woodland] East Africa, 13.iii.1914'. This date would preclude Tanzania so it is thought these are Kenyan specimens probably collected in the coastal woodland somewhere between Mombasa and Malindi. Also in the Nachingwea material there is a male and a female which have the antennal characteristics of *C. orientale* but the male genital structure of *C. julbernardioides*. Furthermore I have examined two male and two females collected on the rift escarpment at Muguga, near Nairobi, which are similarly intermediate.

Clearly the existence of morphologically intermediate specimens must cast doubt on the specific validity of *C. orientale* and it may be argued that these differences are due to the effect of the environment on the phenotype. Whatever the explanation, the observed morphological differences are considered here to have some genetic basis and *C. julbernardioides* and *C. orientale* are regarded as distinct species. The intermediate specimens are not assigned to either taxon.

Ciriacremum africanum Enderlein, 1910 **comb. rev.**

(Text-figs 8, 22, 23, 77, 172–174)

Ciriacremum africanum Enderlein, 1910*b* : 140, figs 2 and B. LECTOTYPE ♂, Tanzania: 'Kilimandjaro' (NR, Stockholm), here designated [examined].
Bunoparia africana (Enderlein) Enderlein, 1926 : 397.

Description. *Colouration.* Overall body colour mid or dark brown with ochraceous markings; dorsum of head and thorax with strongly developed pattern as in Text-fig. 8; genal cones ochraceous apically and ventrally; fore wing hyaline, vein endings often darkened; legs ochraceous.

Structure. ♂. Small species. Genal cones weakly developed (Text-fig. 8); antennal flagellum relatively short, 1·79–1·95 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·4 : 1·5 : 1·6 : 0·9 : 0·7; ultimate rostral segment relatively long, 1·02–1·43 times longer than third antennal segment and 1·57–2·03 times longer than tenth antennal segment. Fore wing 2·38–2·53 times longer than wide, spinule arrangement as in Text-fig. 77; pterostigma short; *Cu* stem two and a half to two and three-quarters times longer than *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 172) with simple basal part and short narrow apical part; paramere (Text-figs 172, 173) strongly compressed, apical two-thirds broader than basal third, on inner surface with an antero-apical tubercle, posterior margin with a compound vertical row of short peg-like setae, postero-basal sensory patch of hairs moderately well developed; distal segment of aedeagus (Text-fig. 174) with narrow apex.

♀. Slightly larger than ♂. Antennal flagellum 1·90–1·95 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·4 : 1·5 : 1·6 : 0·8 : 0·7; ultimate rostral segment 1·00–1·46 times longer than third antennal segment and 1·69–1·91 times longer than tenth antennal segment. Fore wing 2·39–2·56 times longer than wide. Ovipositor short, proctiger 1·32–1·50 times longer than hind tibia.

Measurements (±0·01 mm, based on 10 ♂ and 9 ♀). Maximum width of head, ♂ 0·53–0·64, ♀ 0·52–0·67; length of antennal flagellum, ♂ 0·97–1·20, ♀ 1·05–1·30, length of ultimate rostral segment, ♂ 0·13–0·15, ♀ 0·13–0·16; length of fore wing, ♂ 1·64–1·99, ♀ 1·69–2·24; maximum

width of fore wing, ♂ 0·66–0·82, ♀ 0·69–0·94; length of hind tibia, ♂ 0·38–0·46, ♀ 0·37–0·49; length of ♀ proctiger, 0·54–0·67.

Host plant. Among the material examined was a series of adults collected from *Cassia* sp. No further information is available.

Material examined.

Zaire: 3 ♂, 3 ♀, Elizabethville, x.–xi. 1950, at light; 1 ♂, 2 ♀, 1953–1955, at light; 1 ♀, xi. 1959, at light (*Ch. Seydel*). Angola: 1 ♂, Chianga, 6–7.viii.1963, at light; 12 ♂, 3 ♀, 7–9.ix.1963, at light (*H. Cardosa*); 18 ♂, 31 ♀, 7–9.ix.1966, at light; 9 ♂, 11 ♀, 5–14.ix.1970, yellow trays; 1 ♀, xii. 1970–i. 1971, yellow trays (*A. van Harten*); 22 ♂, 20 ♀, 17.x.1972, at light; 6 ♂, 17 ♀, Ceilunga, 8.x.1972, at light; 4 ♂, Nova Lisboa, 19.viii.1974, at light; 5 ♂, 14 ♀, 19.x.1974 (*J. Passos de Carvalho*); 18 ♂, 22 ♀, 2.ix.1964, on *Cassia* sp. (*E. de Fonseca*). Tanzania: 1 ♂, 1 ♀, Kilimanjaro (type-series).

Discussion. *C. africanum* and the following species are regarded here as sister species. The form of the male paramere is similar in the two species and quite distinct from others in the genus. In *C. vondraceki* sp. n. (p. 51) the male paramere is similar in shape but the postero-medial sensory patch is composed of short non-articulated denticles, while that of *C. africanum* and *C. megafricanum* sp. n. is composed of peg-like articulated setae.

Ciriacremum megafricanum sp. n.

(Text-figs 19, 22, 23, 48, 78, 175–177)

Description. *Colouration.* Similar to *C. africanum* (p. 48).

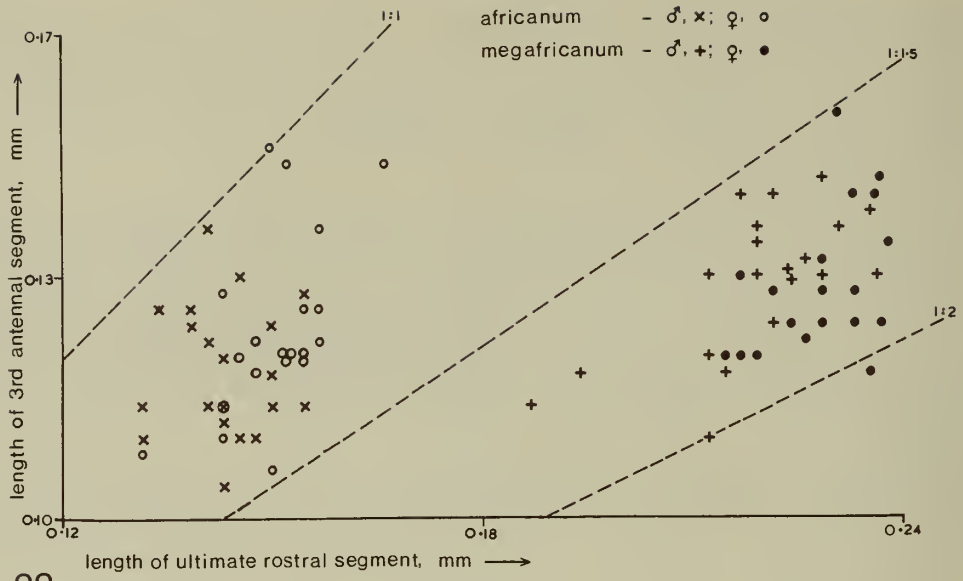
Structure. ♂. Slightly larger than *C. africanum.* Antennal flagellum 1·94–2·14 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·5 : 1·6 : 1·7 : 0·9 : 0·6; ultimate rostral segment much longer than in *C. africanum*, 1·53–2·00 times longer than third antennal segment and 2·19–2·76 times longer than tenth antennal segment. Fore wing 2·41–2·63 times longer than wide, spinule arrangement as in Text-fig. 78. Genitalia similar to *C. africanum* (Text-figs 175–177), inner surface of paramere with slightly better developed group of short cone-like setae postero-medially.

♀. Slightly larger than ♂. Antennal flagellum 1·96–2·10 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·2 : 1·4 : 1·6 : 1·8 : 0·9 : 0·6; ultimate rostral segment 1·51–2·04 times longer than third antennal segment and 2·27–2·94 times longer than tenth antennal segment. Fore wing 2·46–2·67 times longer than wide. Ovipositor (Text-fig. 19) longer than in *C. africanum*, proctiger 1·74–1·95 times longer than hind tibia.

Measurements (±0·01 mm, based on 9 ♂ and 7 ♀). Maximum width of head, ♂ 0·54–0·72, ♀ 0·56–0·69; length of antennal flagellum, ♂ 1·05–1·41, ♀ 1·18–1·45; length of ultimate rostral segment, ♂ 0·19–0·24, ♀ 0·22–0·25; length of fore wing, ♂ 1·64–2·31, ♀ 1·97–2·34; maximum width of fore wing, ♂ 0·63–0·91, ♀ 0·77–0·92; length of hind tibia, ♂ 0·45–0·58, ♀ 0·48–0·58; length of ♀ proctiger, 0·87–1·08.

Host plant. Unknown, all known material collected in traps or as vagrants.

Holotype ♂, Angola: Nova Lisboa, 19.viii.1974 (*J. Passos de Carvalho*) (BMNH, London); slide mounted.



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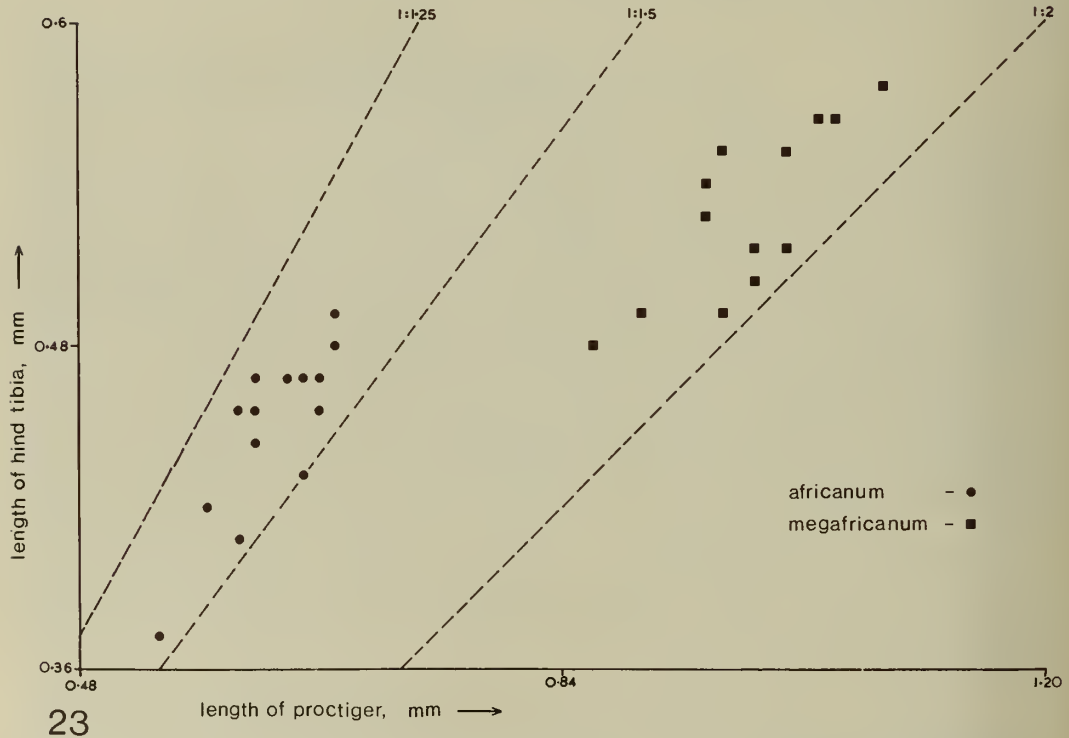

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FIGS 22, 23. Scatter diagrams comparing lengths of various characters of *Ciriacremum africanum* and *C. megafricanum*. 22, length of third antennal segment against length of ultimate rostral segment; 23, length of female hind tibia against length of female proctiger.

Paratypes. Angola: 22 ♂, 32 ♀, same data as holotype; 1 ♂, 2 ♀, Dundo, 4–29.viii.1953, at light (*Luna*); 3 ♂, 2 ♀, Chianga, 2–7.viii.1963, at light; 1 ♂, 2 ♀, 7–9.ix.1963 (*H. Cardosa*); 47 ♂, 62 ♀, 7–9.xi.1966, at light; 24 ♂, 24 ♀, 17.x.1972, at light; 6 ♂, 12 ♀, 26.viii.1974, at light (*J. Passos de Carvalho*); 2 ♂, 1 ♀, 5–14.ix.1970, yellow trays (*A. van Harten*); 1 ♀, Tundavala, 8–10 mls [13–16 km] NW. Sa da Bandeira, 27–29.iii.1972, general sweeping (*BM Southern Africa Expedition*) (BMNH, London; NCI, Pretoria; USNM, Washington); slide mounted and stored in 80% ethanol.

Discussion. *C. megafricanum* is very similar to *C. africanum*. The two species are distinguished from one another by the relative lengths of their ultimate rostral segments (Text-fig. 22) and female proctiger (Text-fig. 23), both structures being much longer in *C. megafricanum*. This would suggest either the two species have different host plants or, if not, then they have different feeding and oviposition sites on a common host. The host plant of *C. africanum* is probably *Cassia* sp. but *C. megafricanum* is only known from trapped and vagrant material. Both species occur together in trap catches.

Ciriacremum vondraceki sp. n.

(Text-figs 49, 79, 178–180)

Description. ♂. Small species. Genal cones poorly developed (Text-fig. 49); antennal flagellum 2·89–3·22 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·3 : 1·4 : 2·0 : 0·6 : 0·4; ultimate rostral segment short, 0·52–0·61 times as long as third antennal segment and 1·46–1·66 times longer than tenth antennal segment. Fore wing 2·43–2·71 times longer than wide, spinule arrangement as in Text-fig. 79; pterostigma short; *Cu* stem about one and three-quarter times longer than *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 178) with simple basal part and a relatively short narrow apical part; paramere (Text-figs 178, 179) compressed, with short narrow apical part and broad basal part, on inner surface with a well developed apical tooth and a postero-medial group of large non-articulated denticles, postero-basal setae not at all developed; distal segment of aedeagus (Text-fig. 180) with broad apex and an extraordinary long terminal tube; hypovalves (Text-fig. 178) moderately long and broad.

♀. Slightly larger than ♂. Antennal flagellum 3·05–3·11 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 0·9 : 1·0 : 1·4 : 1·5 : 1·9 : 0·6 : 0·3; ultimate rostral segment 0·58–0·62 times as long as third antennal segment and 1·73–1·76 times longer than tenth antennal segment. Fore wing 2·47–2·52 times longer than wide. Ovipositor relatively short, proctiger 1·04–1·09 times longer than hind tibia.

Measurements (±0·01 mm, based on 3 ♂ and 2 ♀). Maximum width of head, ♂ 0·63–0·65, ♀ 0·71; length of antennal flagellum, ♂ 1·81–2·08, ♀ 2·16–2·20; length of ultimate rostral segment, ♂ 0·13–0·14, ♀ 0·15; length of fore wing, ♂ 1·91–2·16, ♀ 2·39–2·46; maximum width of fore wing, ♂ 0·73–0·89, ♀ 0·95–1·00; length of hind tibia, ♂ 0·47–0·48, ♀ 0·52–0·53; length of ♀ proctiger, 0·56–0·57.

Host plant. Unknown, the type-series was collected at light.

Holotype ♂, Angola: Dundo, ii.–iii. 1954, at light (*Luna*) (BMNH, London); slide mounted.

Paratypes. Angola: 2 ♂, 2 ♀, same data and depository as holotype; slide mounted.

Discussion. *C. vondraceki* sp. n. is superficially similar to *C. africanum* but may be distinguished by its relatively longer antennae and the form of the male genitalia. The male paramere is very unusual in that on the postero-medial inner surface there is a large patch of apparently non-articulated denticles. Normally this area bears strongly developed articulated setae. Also in *C. vondraceki* the terminal tube of the aedeagus is very large.

In the BMNH collections there are several specimens of both sexes from various localities in Central and West Africa which are similar to the type-series of *C. vondraceki* but show clear differences in the structure of the distal segment of the aedeagus (Text-figs 181, 182), wing venation and spinule arrangement. In the male specimens the aedeagus bears a large terminal tube, very similar to *C. vondraceki*, but different from one another in each case. Furthermore the male parameres are similarly adorned with non-articulated spinules on the inner postero-medial surface as in *C. vondraceki*. I suspect that these forms, together with *C. vondraceki*, form a complex of closely related species but inadequate material precludes further description at present.

Ciriacremum jilorense sp. n.

(Text-figs 50, 80, 135–137)

Description. *Colouration.* Overall body colour from green to mid brown with ochraceous markings; pattern on dorsum of head and thorax similar to *C. bicaudatum* (Text-fig. 7); genal cones ochraceous apically and dark brown or black ventrally; pleurae ochraceous or light brown; fore wing hyaline with a dark brown spot proximal to point where claval suture meets hind margin; legs mainly ochraceous, femora dark brown medially; abdomen dark along dorsal mid line, pale laterally and ventrally.

Structure. ♂. Small species. Genal cones moderately well developed (Text-fig. 50); antennal flagellum relatively short, 2·35–2·51 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·4 : 1·6 : 1·8 : 0·7 : 0·5; ultimate rostral segment short, 0·55–0·70 times as long as third antennal segment and 1·26–1·45 times longer than tenth antennal segment. Fore wing 2·26–2·44 times longer than wide, spinule arrangement as in Text-fig. 80; pterostigma short; *Cu* stem two to two and a half times longer than *M*+*Cu* stem; first cubital cell about one and a half times longer than wide. Proctiger (Text-fig. 135) with simple, relatively narrow basal part, and short narrow apical part; paramere (Text-figs 135, 136) relatively large, compressed, on inner surface in apical half with a vertical ridge on anterior margin, and a compound row of differentiated setae on posterior margin, a well developed tubercle medially and with a poorly developed postero-basal sensory patch of setae; distal segment of aedeagus (Text-fig. 137) with narrow apex; hypovalves (Text-fig. 135) short, narrow.

♀. Slightly larger than ♂. Antennal flagellum 2·19–2·27 times longer than width of head, relative lengths of flagellar segments from base to apex – 1·0 : 1·0 : 1·1 : 1·3 : 1·5 : 1·7 : 0·7 : 0·5; ultimate rostral segment 0·63–0·70 times as long as third antennal segment and 1·32–1·44 times longer than tenth antennal segment. Fore wing 2·22–2·46 times longer than wide. Ovipositor of moderate length, proctiger 1·55–1·81 times longer than hind tibia.

Measurements (±0·01 mm, based on 7 ♂ and 5 ♀). Maximum width of head, ♂ 0·61–0·74, ♀ 0·68–0·79; length of antennal flagellum, ♂ 1·51–1·83, ♀ 1·49–1·76; length of ultimate rostral segment, ♂ 0·11–0·12, ♀ 0·12–0·13; length of fore wing, ♂ 1·73–2·00, ♀ 2·00–2·31; maximum width of fore wing, ♂ 0·71–0·88, ♀ 0·82–1·05; length of hind tibia, ♂ 0·43–0·50, ♀ 0·45–0·54; length of ♀ proctiger, 0·75–0·85.

HOST PLANT. The type-series was collected from several specimens of *Cynometra webberi* Baker in the Kenya coastal *Brachystegia* woodland; no larvae were found.

Holotype ♂, KENYA: Arabuku-Sokoke Forest, Jilore track, 2–3.vii.1974, from *Cynometra webberi* (*David Hollis*) (BMNH, London); dry mounted.

Paratypes. KENYA: 9 ♂, 14 ♀, same data as holotype (BMNH, London; NM, Nairobi); slide and dry mounted.

DISCUSSION. *C. jilorense* sp. n. is difficult to relate to other species in the genus, having quite distinctive male genitalia. The relatively simple paramere is similar to the primitive type found in *Kleiniella* species and it may be that *C. jilorensis* is an early offshoot of the main *Ciriacremum* stock. Chorological and host plant evidence would also suggest this species has been isolated from the bulk of the Central African species for some considerable time.

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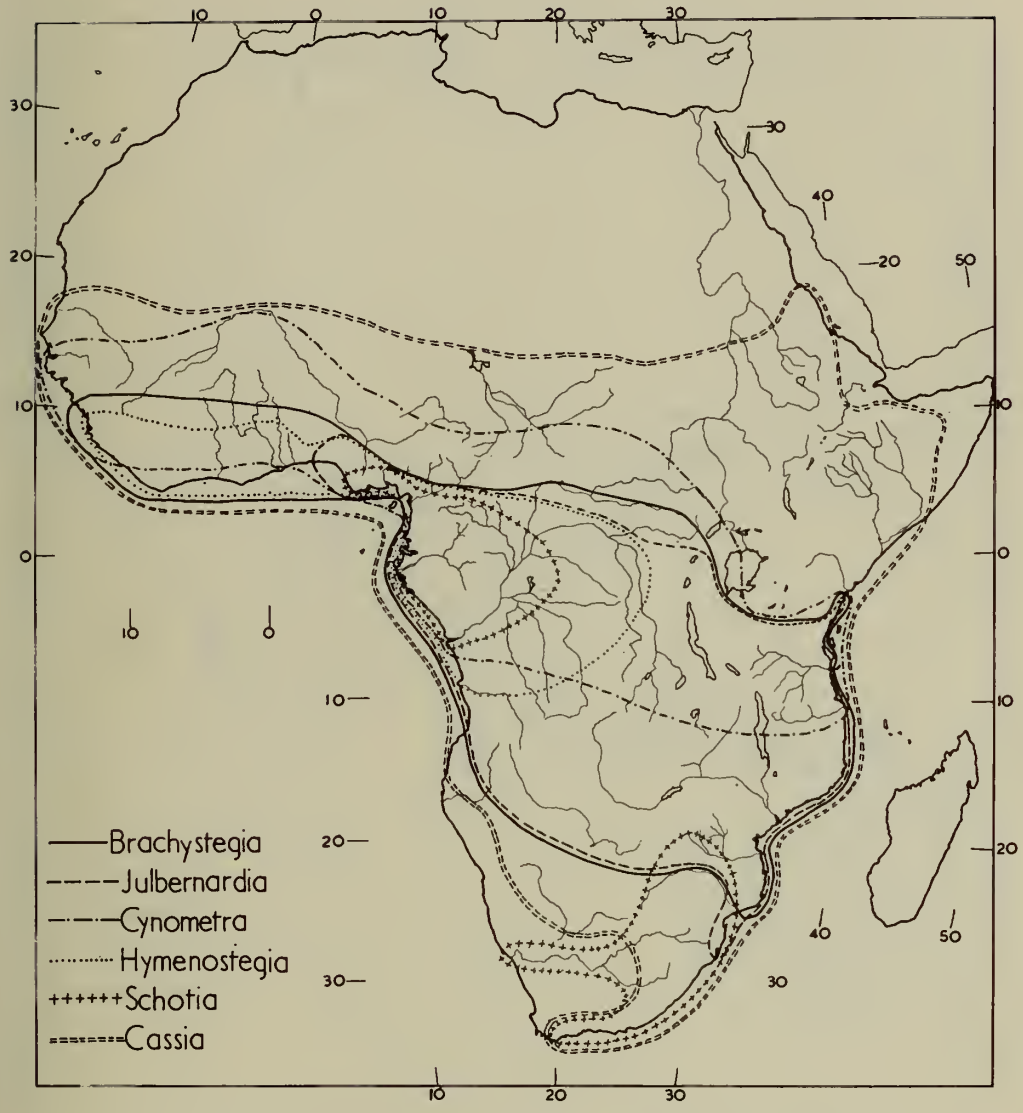
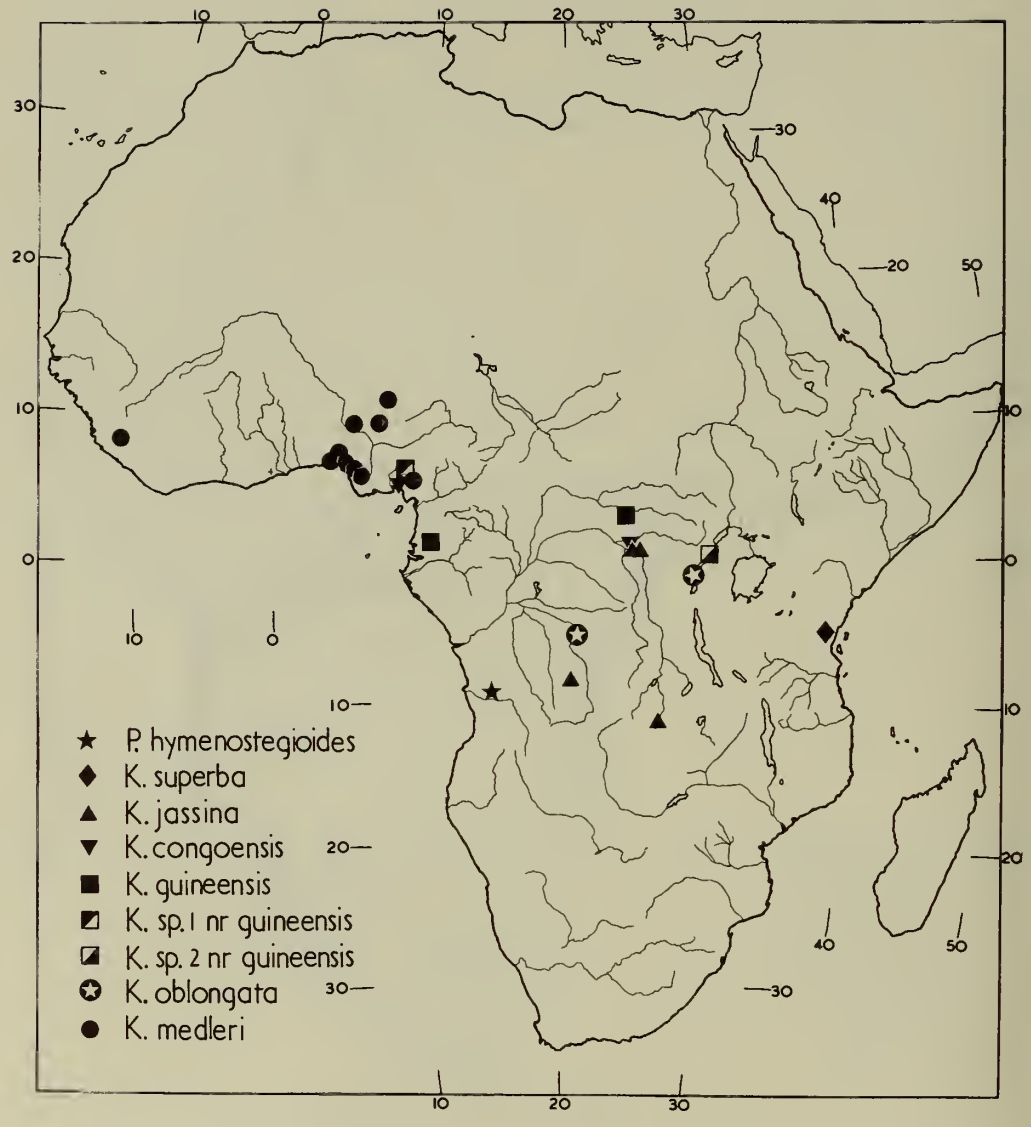
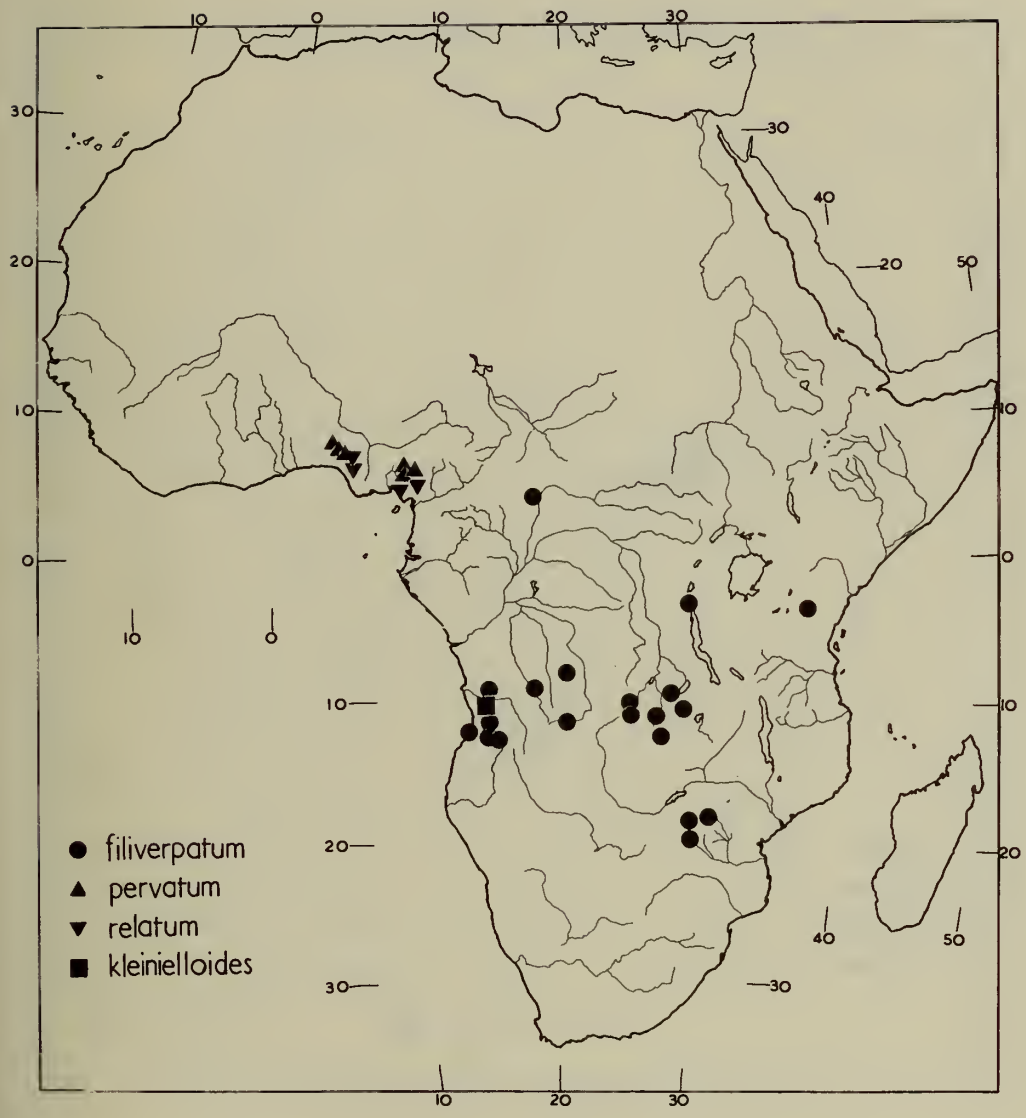


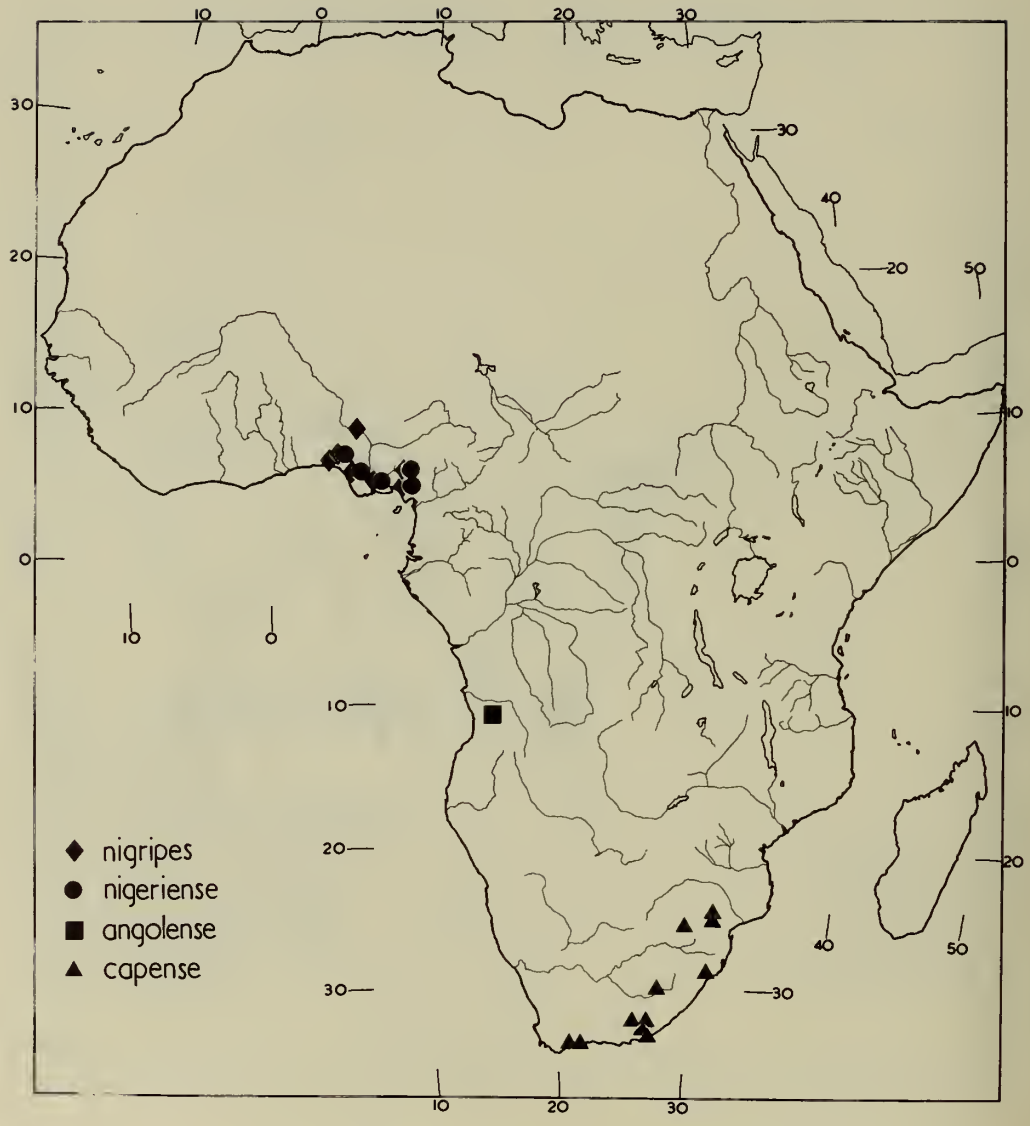
Map 1. Estimated distribution limits in Ethiopian region of six genera of Caesalpiniaceae recorded as hosts of Ciriacremini.



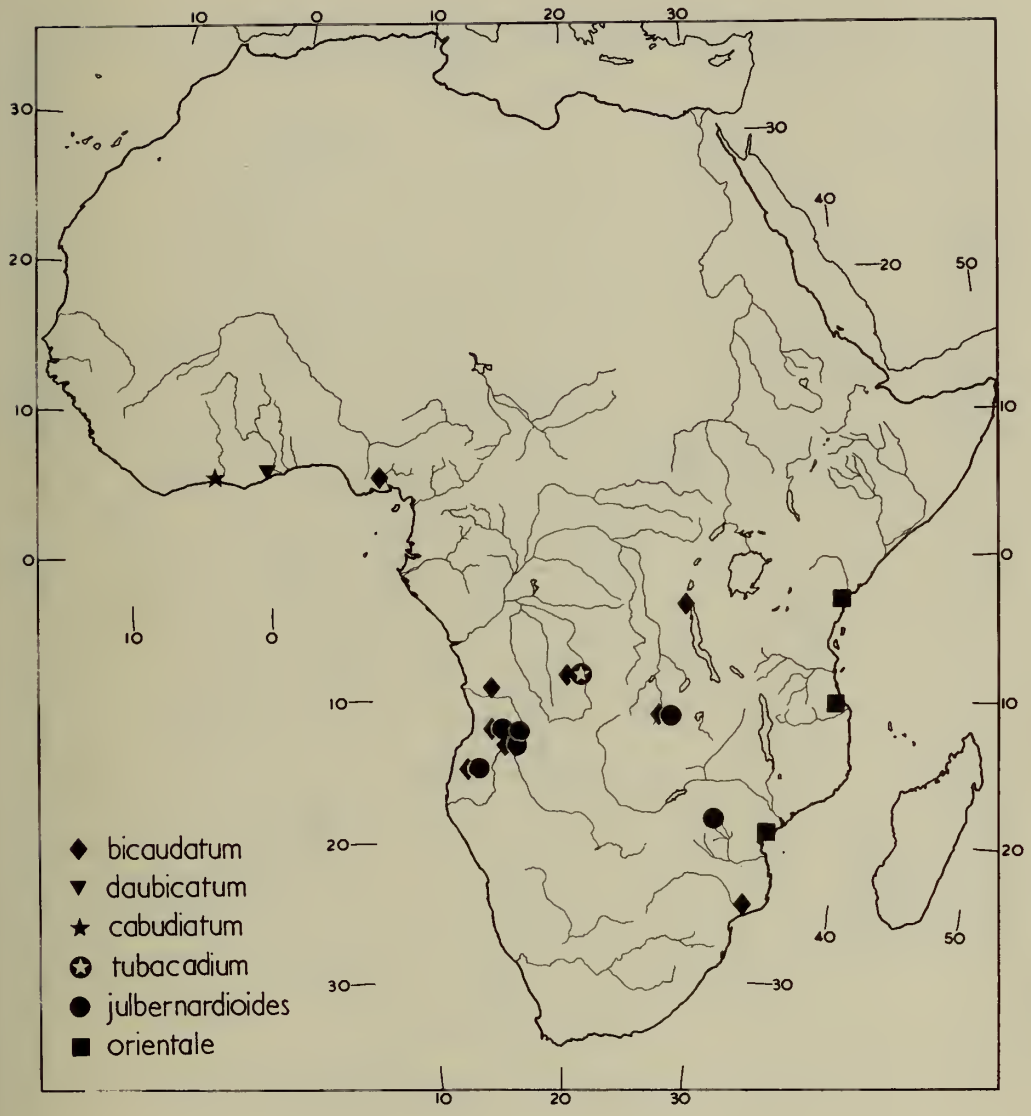
Map 2. Distribution of *Palmapenna hymenostegioides* and *Kleiniella* species.



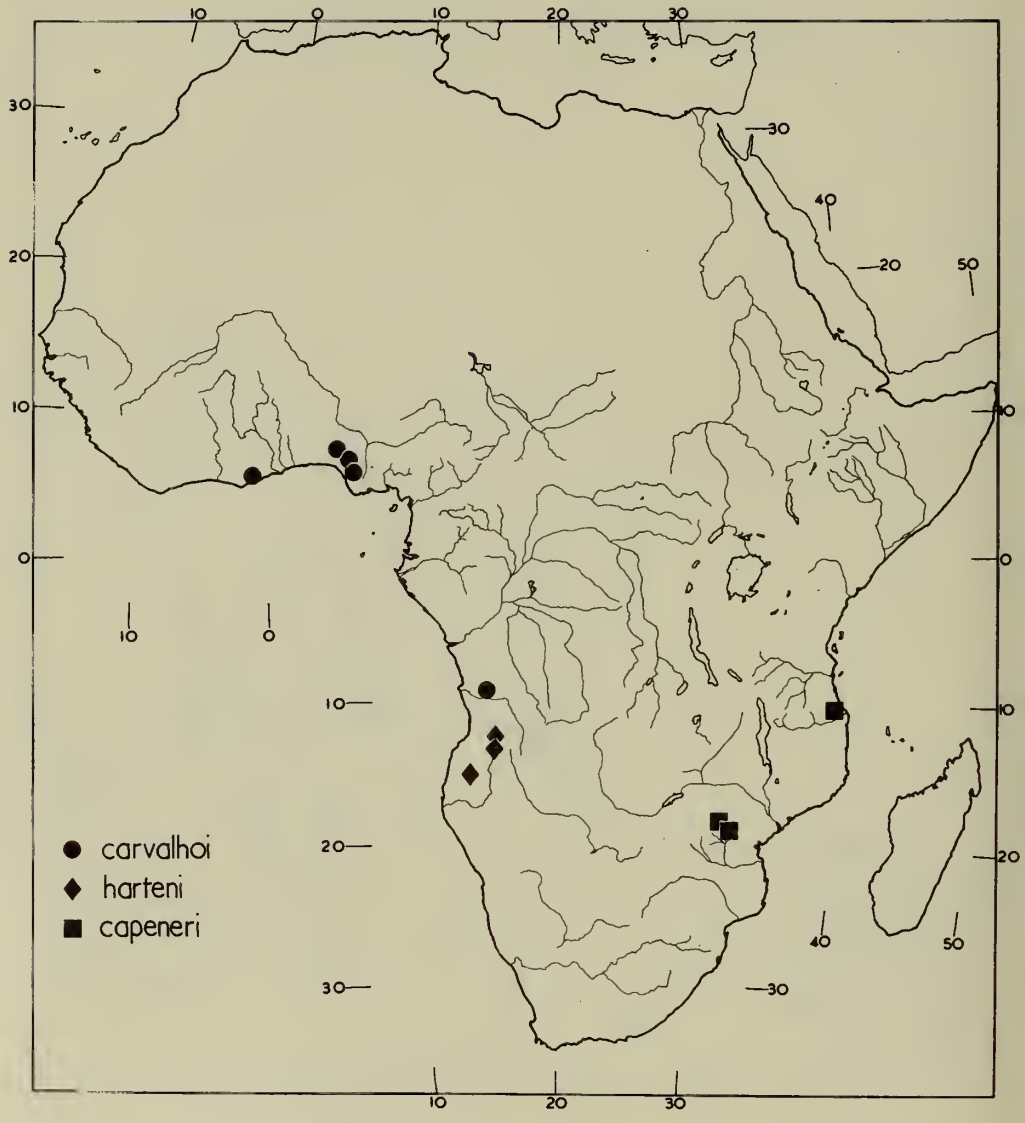
Map 3. Distribution of *Ciriacremum* species, *filiverpatum*-group.



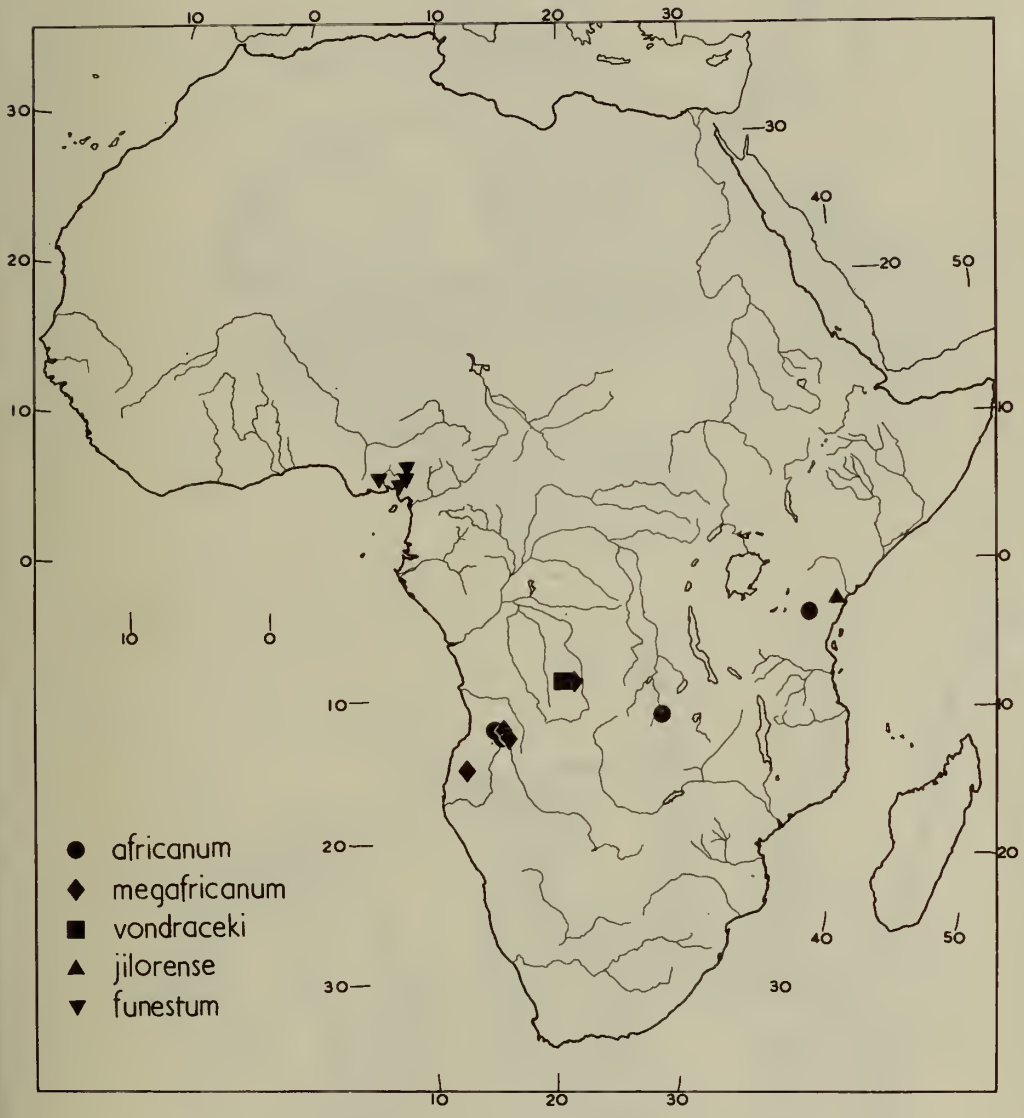
Map 4. Distribution of *Ciriacremum* species.



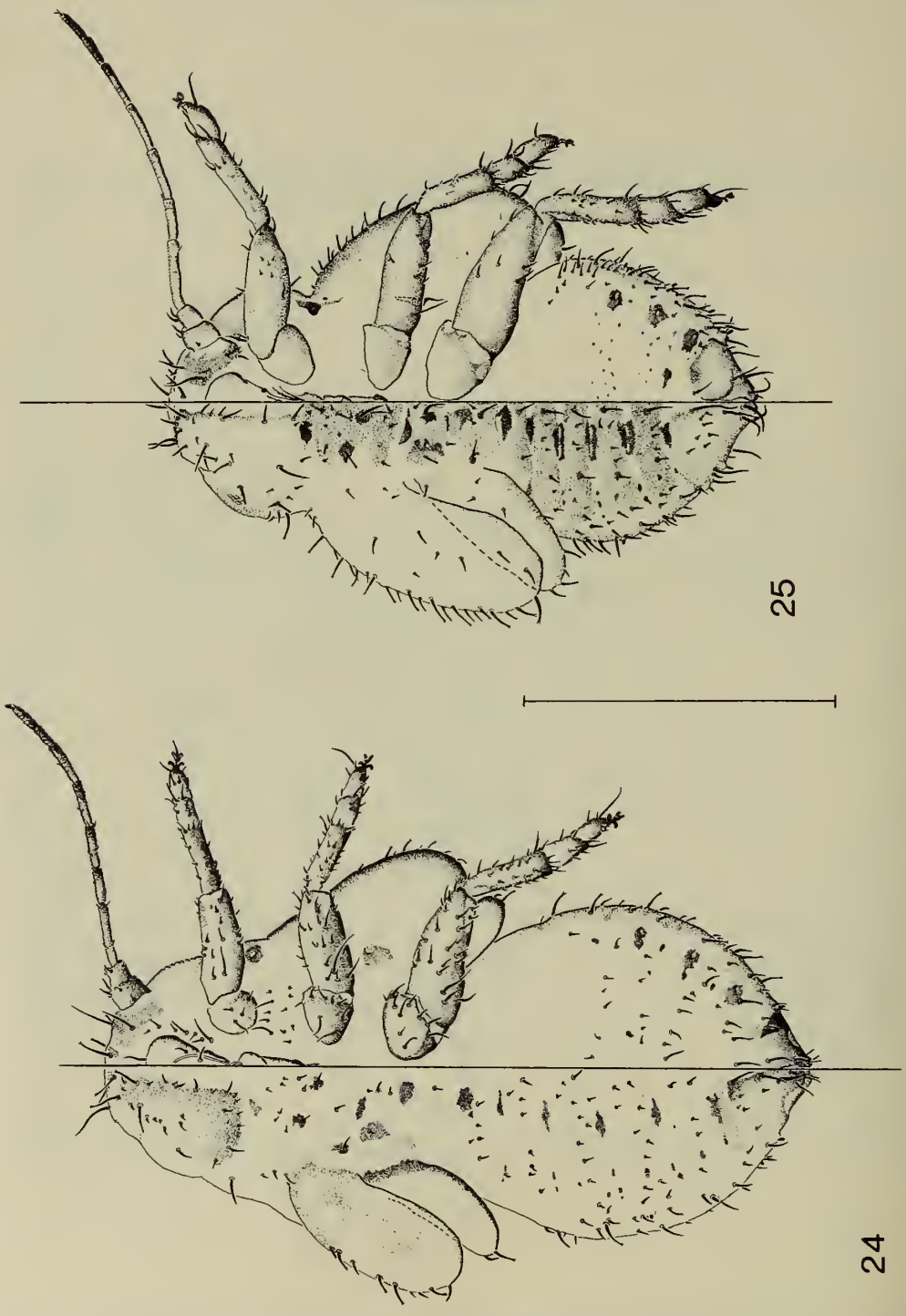
MAP 5. Distribution of *Ciriacremum* species, *bicaudatum*-group, part.



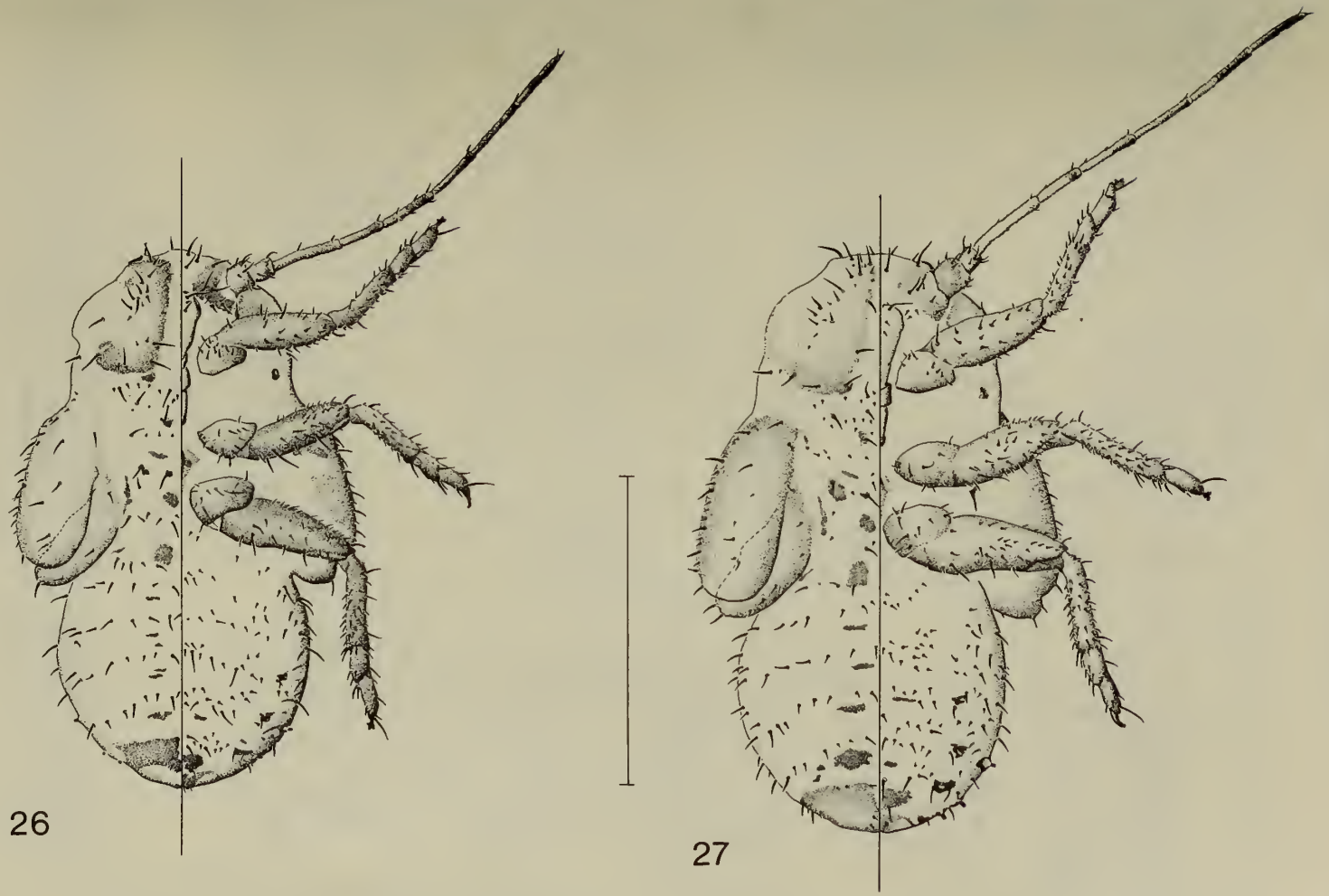
Map 6. Distribution of *Ciriacremum* species, *bicaudatum*-group, part.



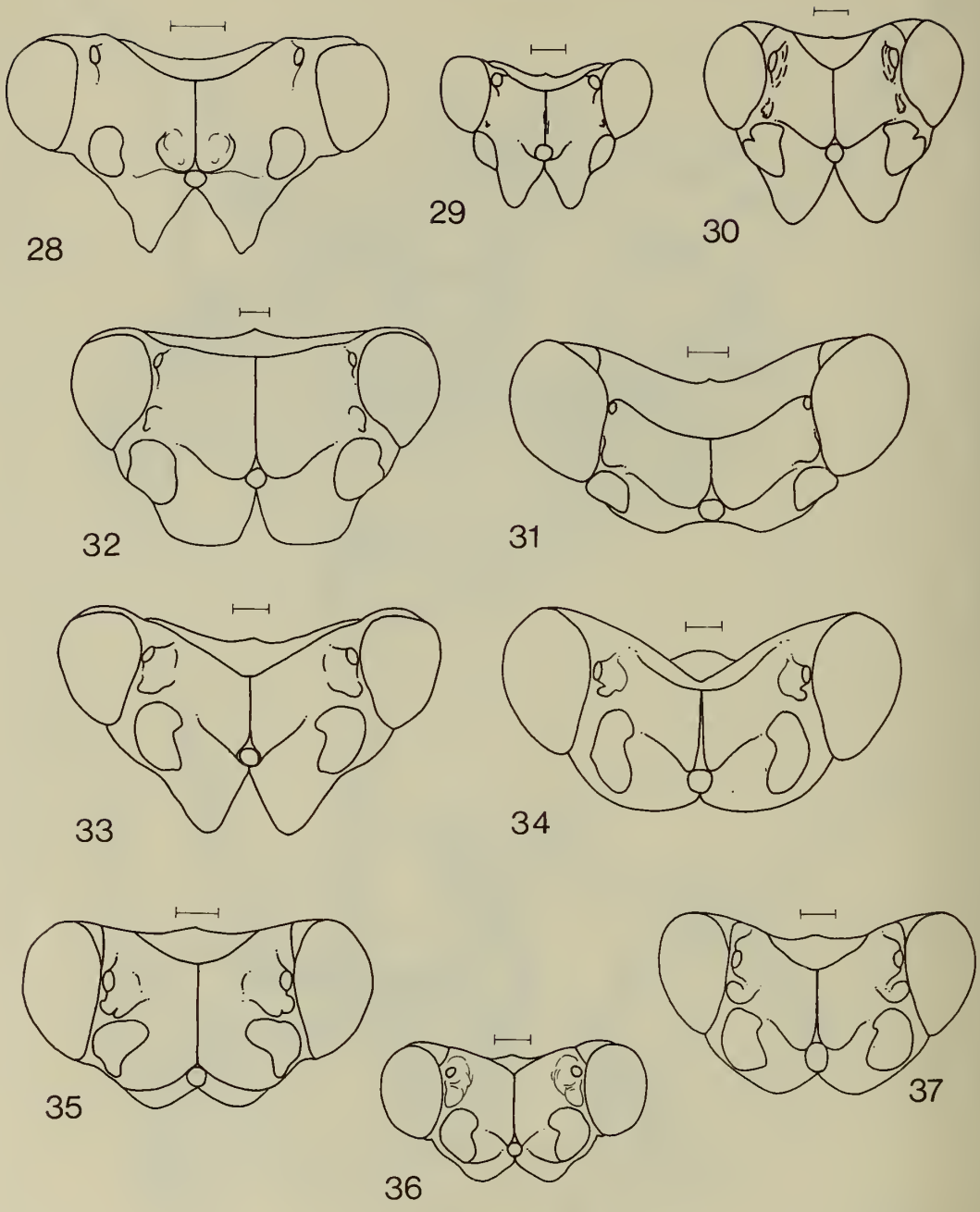
MAP 7. Distribution of *Ciriacremum* species.



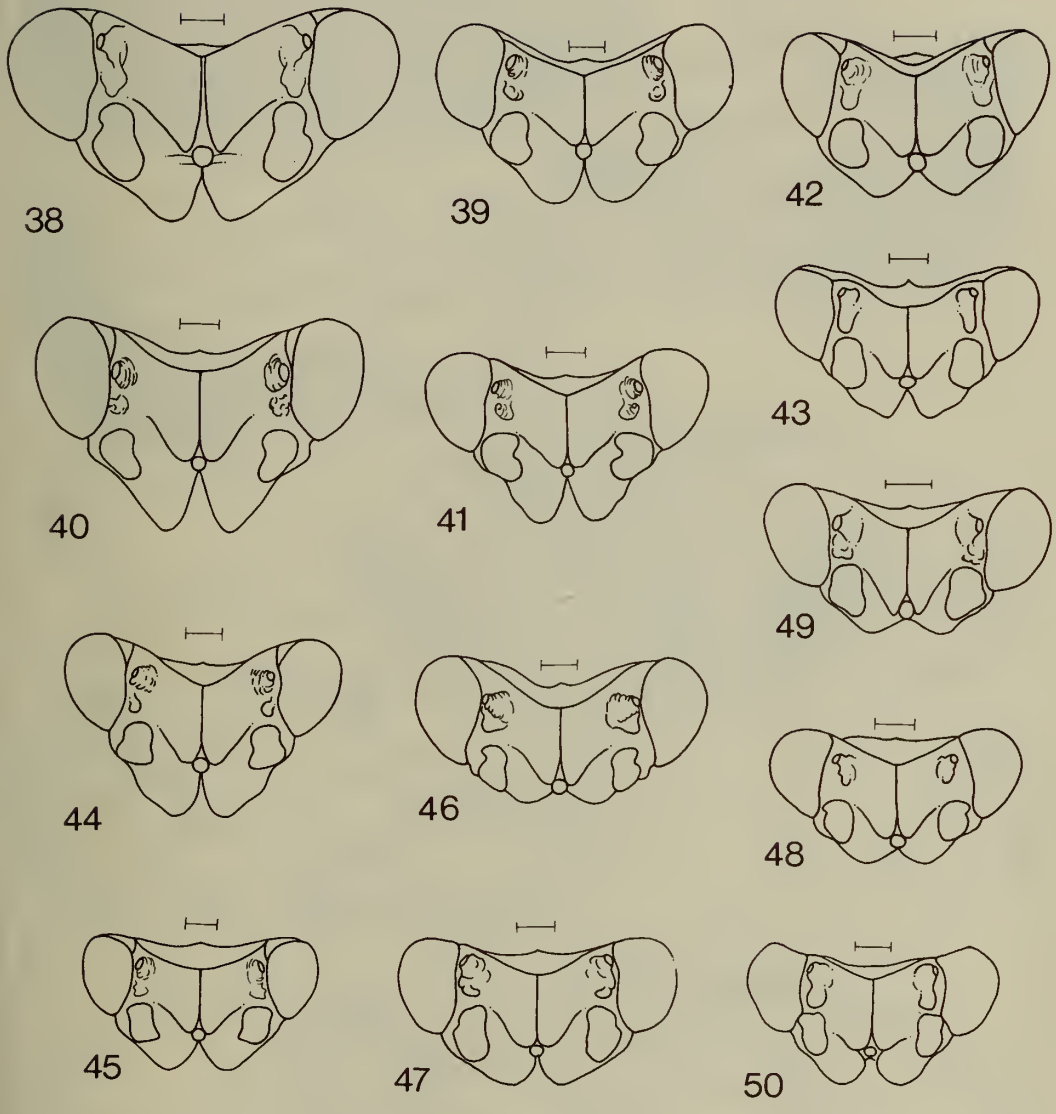
FIGS 24, 25. *Ciriacremum* species, late instar larvae. 24, *C. harteni*; 25, *C. julbernardioides*. Scale line represents 1·0 mm.



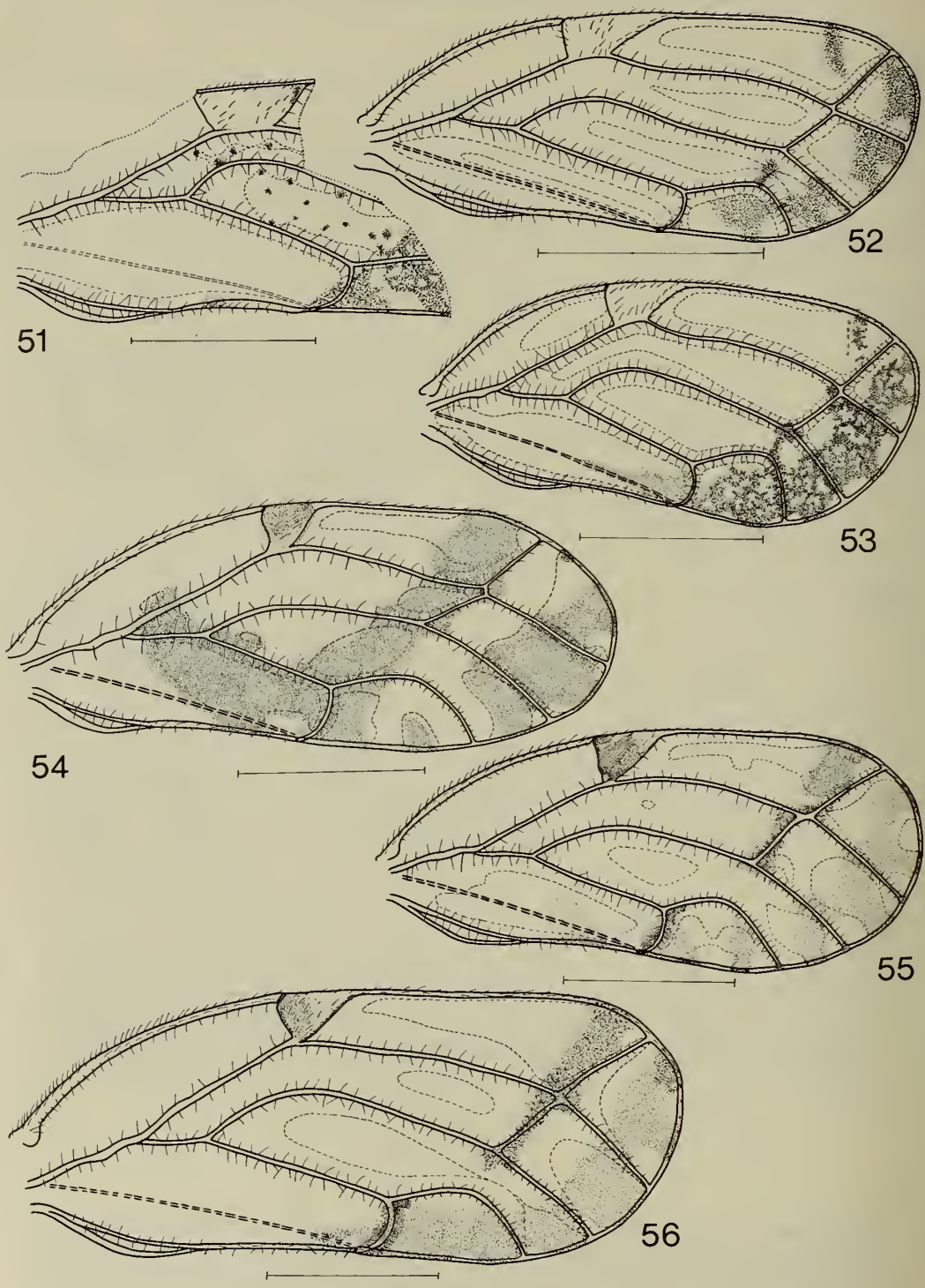
FIGS 26, 27. *Ciriacremum* species, late instar larvae. 26, *C. capense*; 27, *C. capeneri*. Scale line represents 1·0 mm.



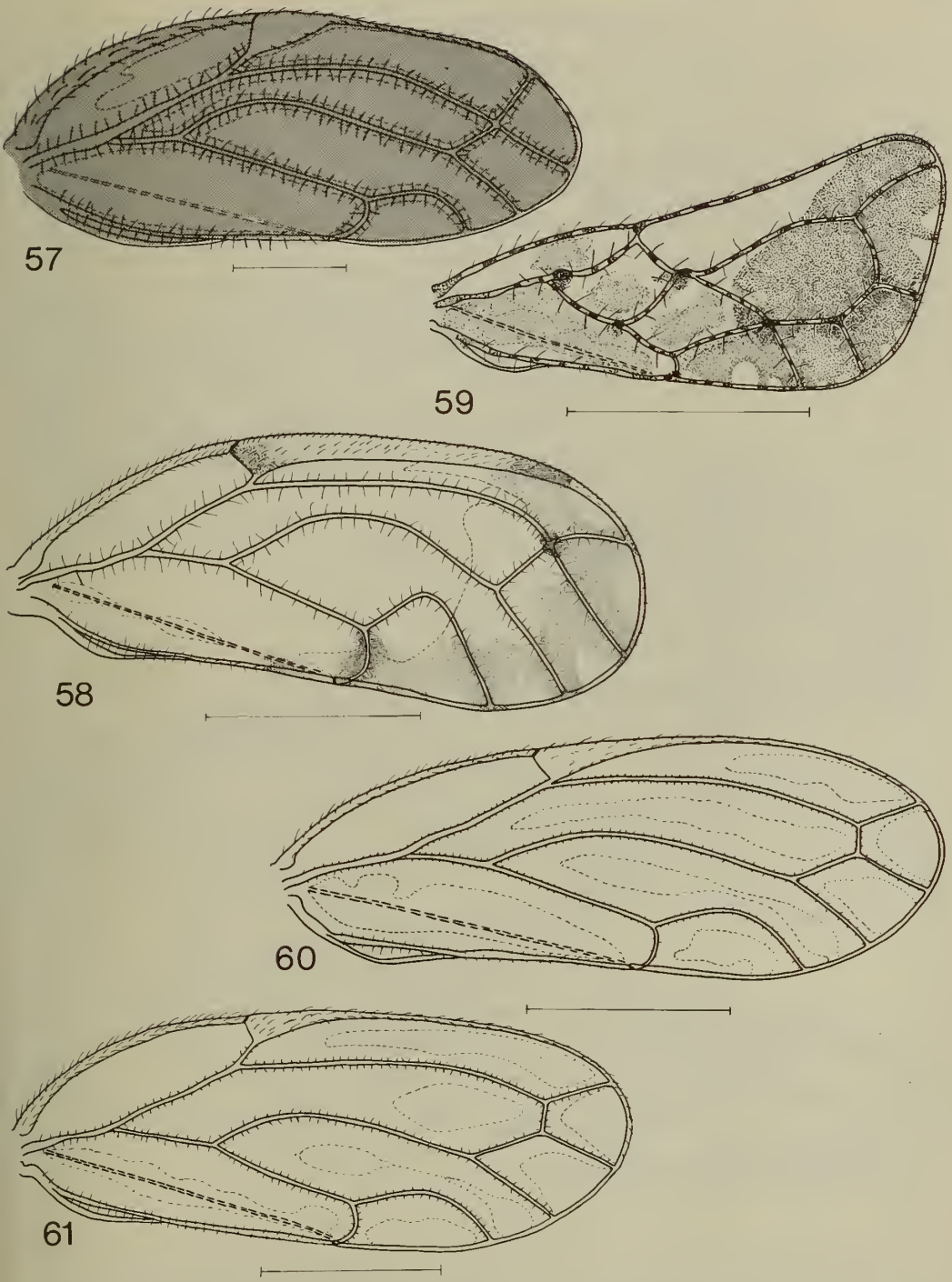
FIGS 28–37. Ciriacremini species; head, dorsal view. 28, *Panisopelma* (*Connectopelma*) *conifrons*; 29, *Palmapenna hymenostegioides*; 30, *Kleiniella guineensis*; 31, *K. jassina*; 32, *K. oblongata*; 33, *K. medleri*; 34, *Ciriacremum filiverpatum*; 35, *C. nigripes*; 36, *C. nigeriense*; 37, *C. angolense*. Scale line represents 0·1 mm.



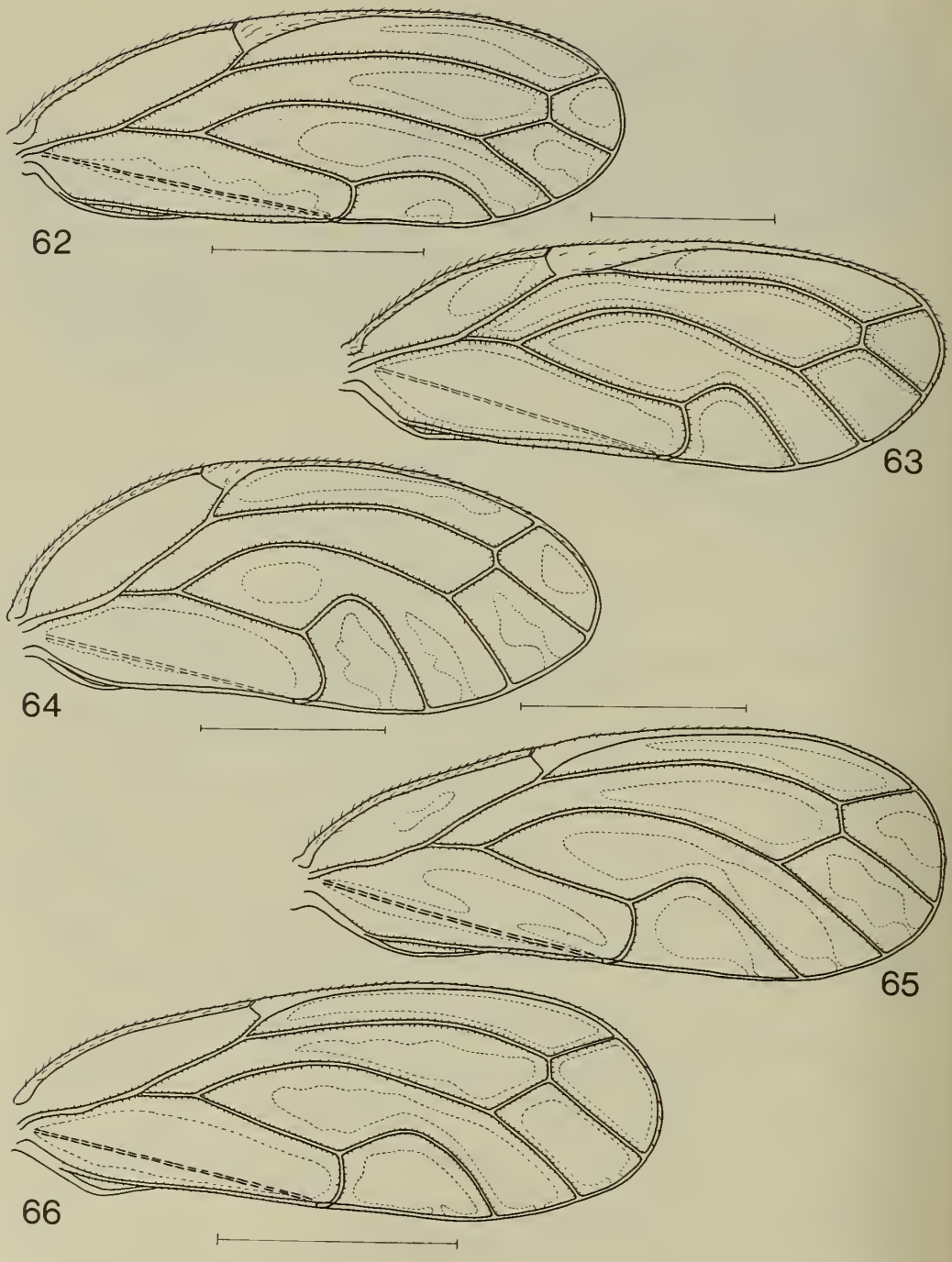
FIGS 38–50. *Ciriacremum* species; head, dorsal view. 38, *C. bicaudatum*; 39, *C. daubicatum*; 40, *C. cabudiatum*; 41, *C. tubacadium*; 42, *C. harteni*; 43, *C. capeneri*; 44; *C. carvalhoi*; 45, *C. julbernardioides*; 46, *C. funestum*; 47, *C. capense*; 48, *C. megafricanum*; 49, *C. vondraceki*; 50, *C. jilorense*. Scale line represents 0·1 mm.



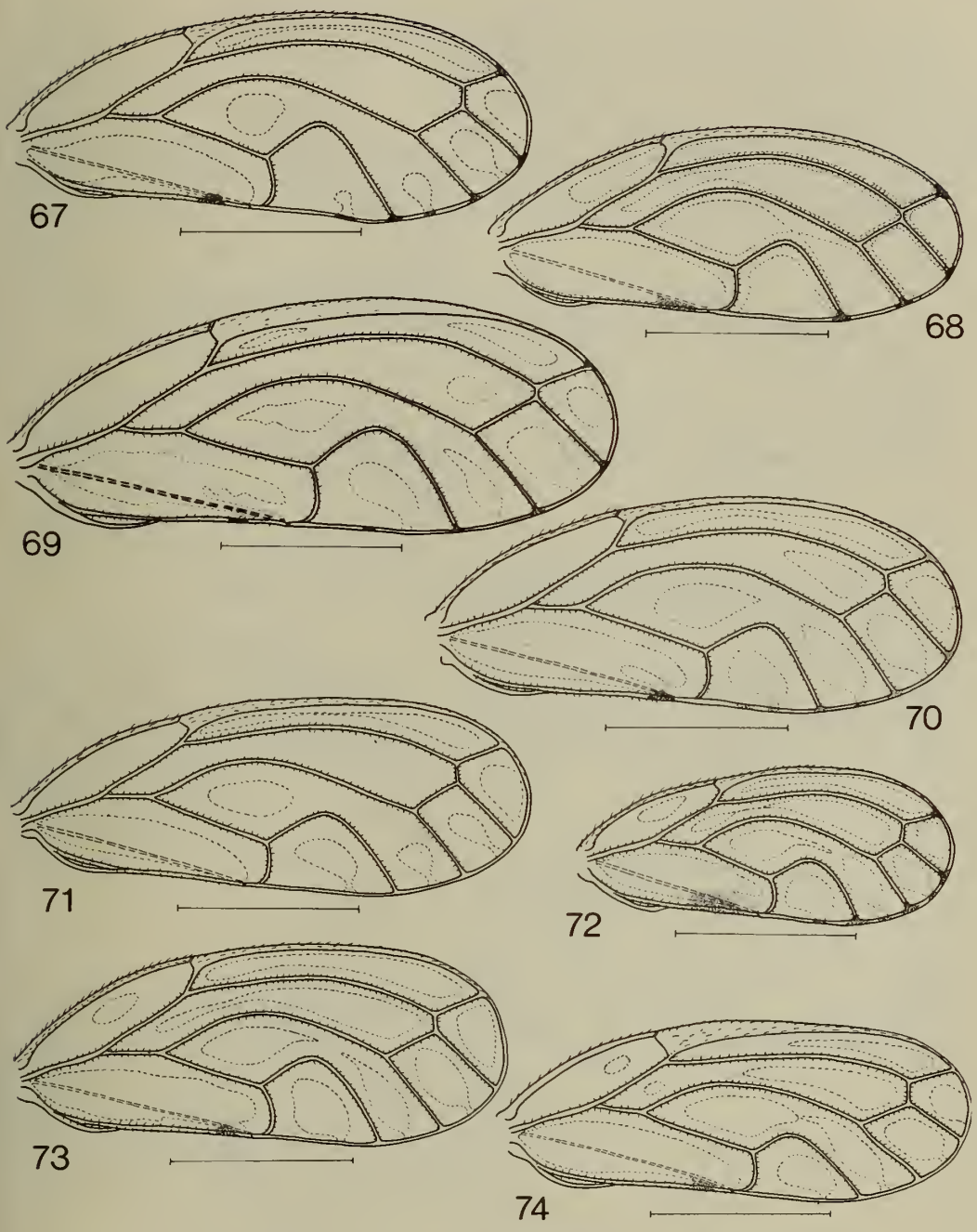
FIGS 51–56. *Kleiniella* species, fore wings. 51, *K. superba*; 52, *K. jassina*; 53, *K. congoensis*; 54, *K. guineensis*; 55, *Kleiniella* species 1 near *guineensis*; 56, *Kleiniella* species 2 near *guineensis*. Scale line represents 1·0 mm.



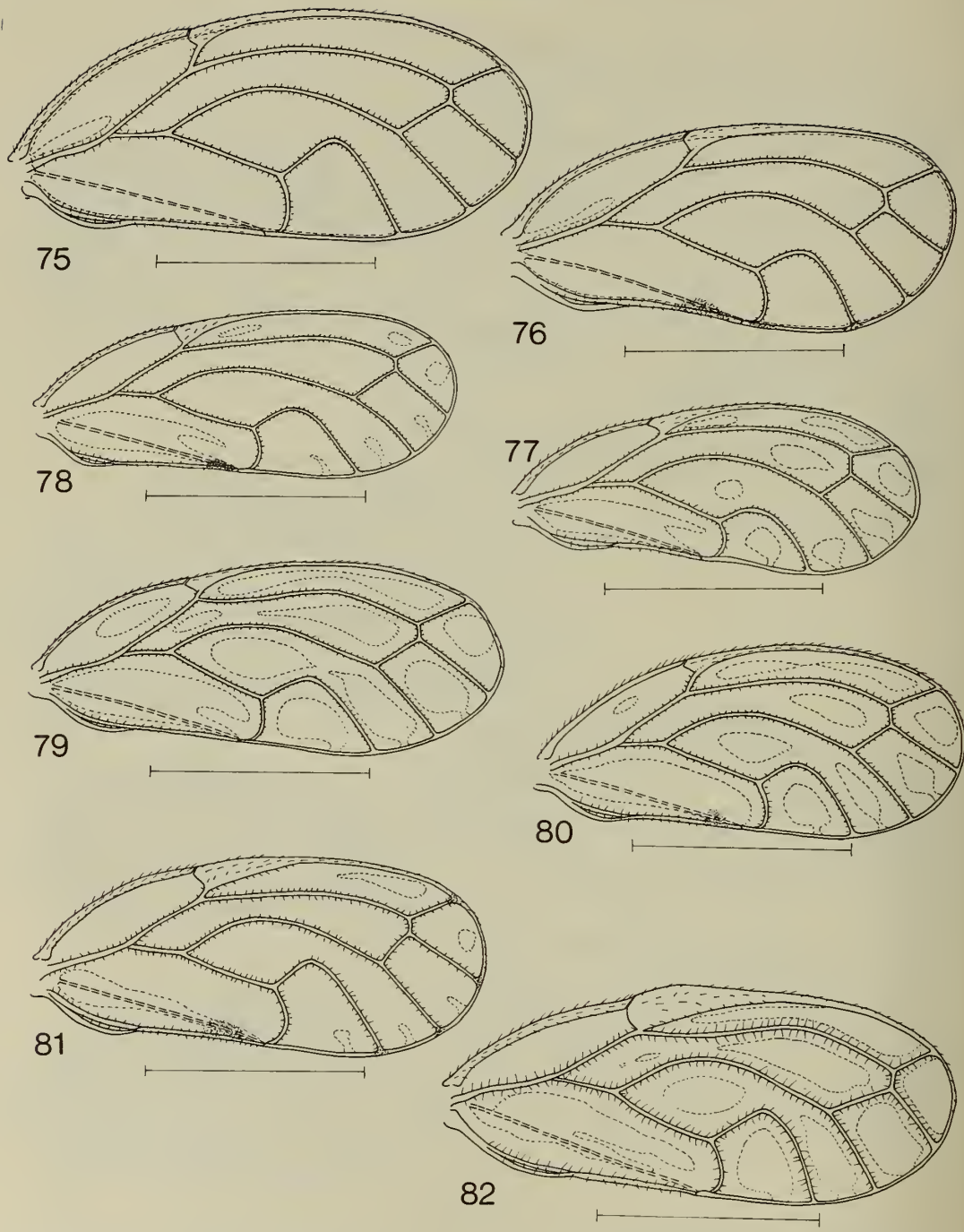
FIGS 57–61. Ciriacremini species, fore wings. 57, *Kleiniella oblongata*; 58, *K. medleri*; 59, *Palmapenna hymenostegioides*; 60, *Ciriacremum filiverpatum*; 61, *C. relatum*. Scale line represents 1·0 mm.



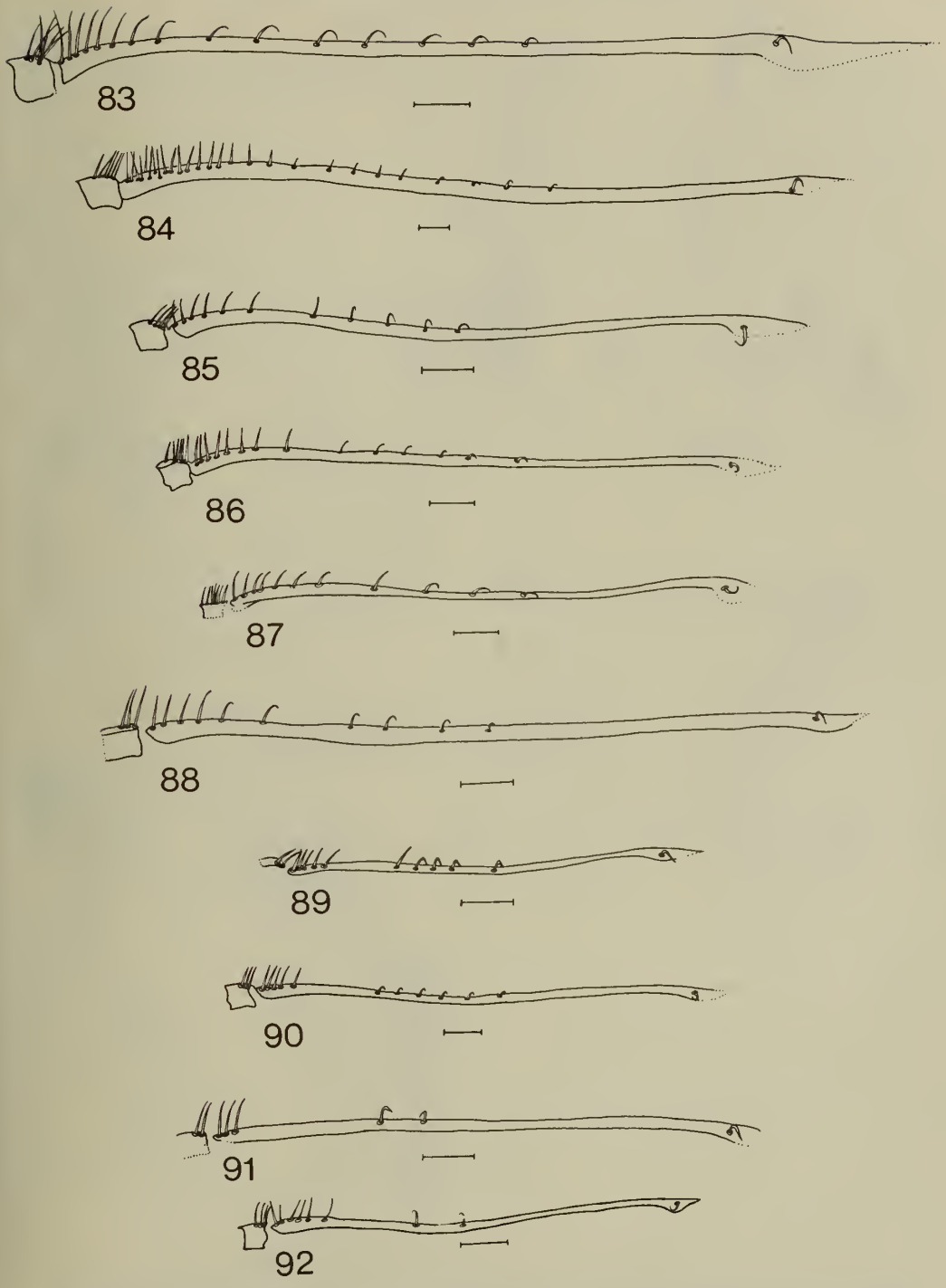
FIGS 62–66. *Ciriacremum* species, fore wings. 62, *C. pervatum*; 63, *C. kleinielloides*; 64, *C. angolense*; 65, *C. nigripes*; 66, *C. nigeriense*. Scale line represents 1·0 mm.



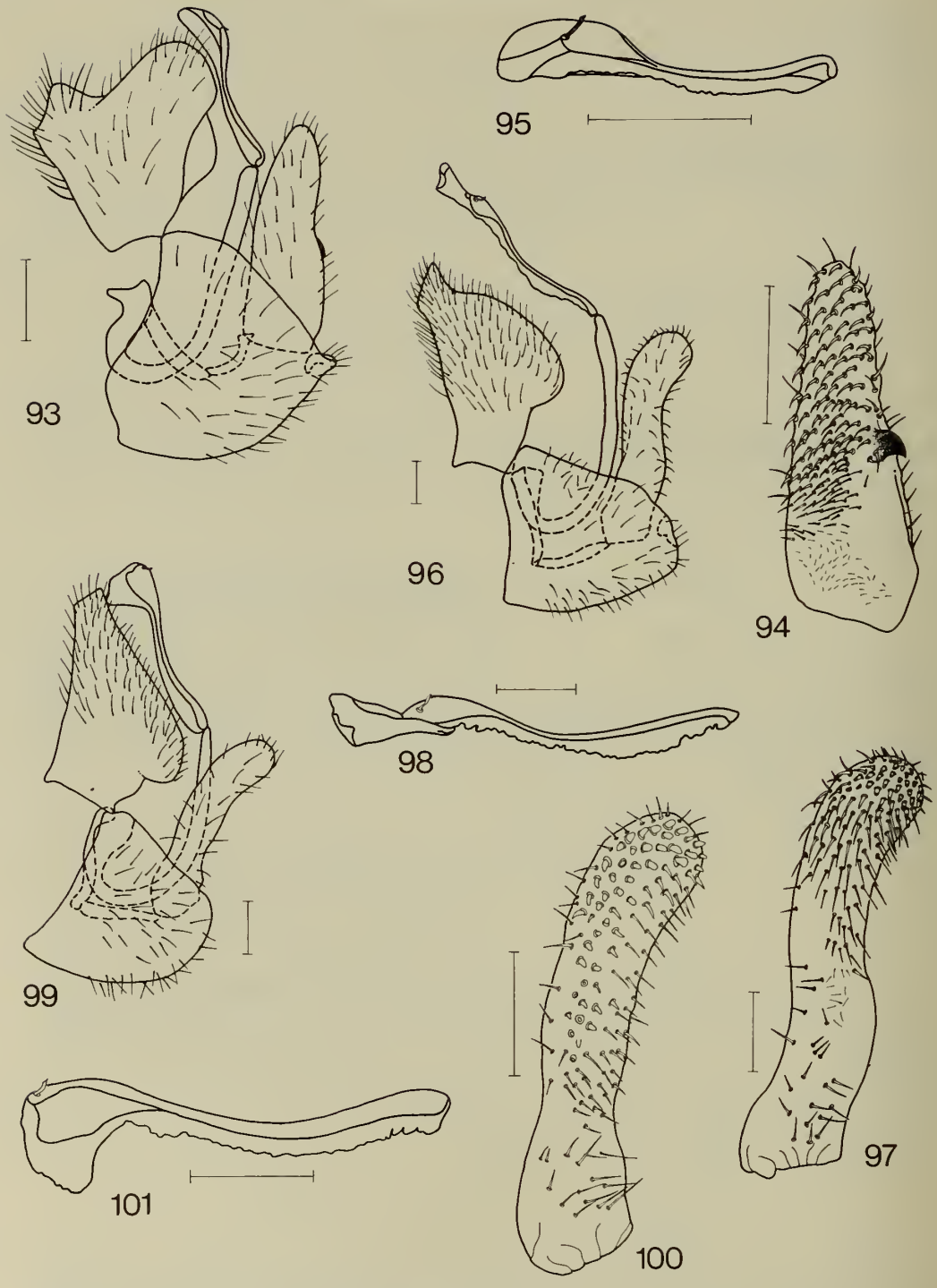
FIGS 67–74. *Ciriacremum* species, fore wings. 67, *C. bicaudatum*, from Angola; 68, same, from Nigeria; 69, *C. daubicatum*; 70, *C. cabudiatum*; 71, *C. tubacadium*; 72, *C. harteni*; 73, *C. carvalhoi*; 74, *C. capeneri*. Scale line represents 1·0 mm.



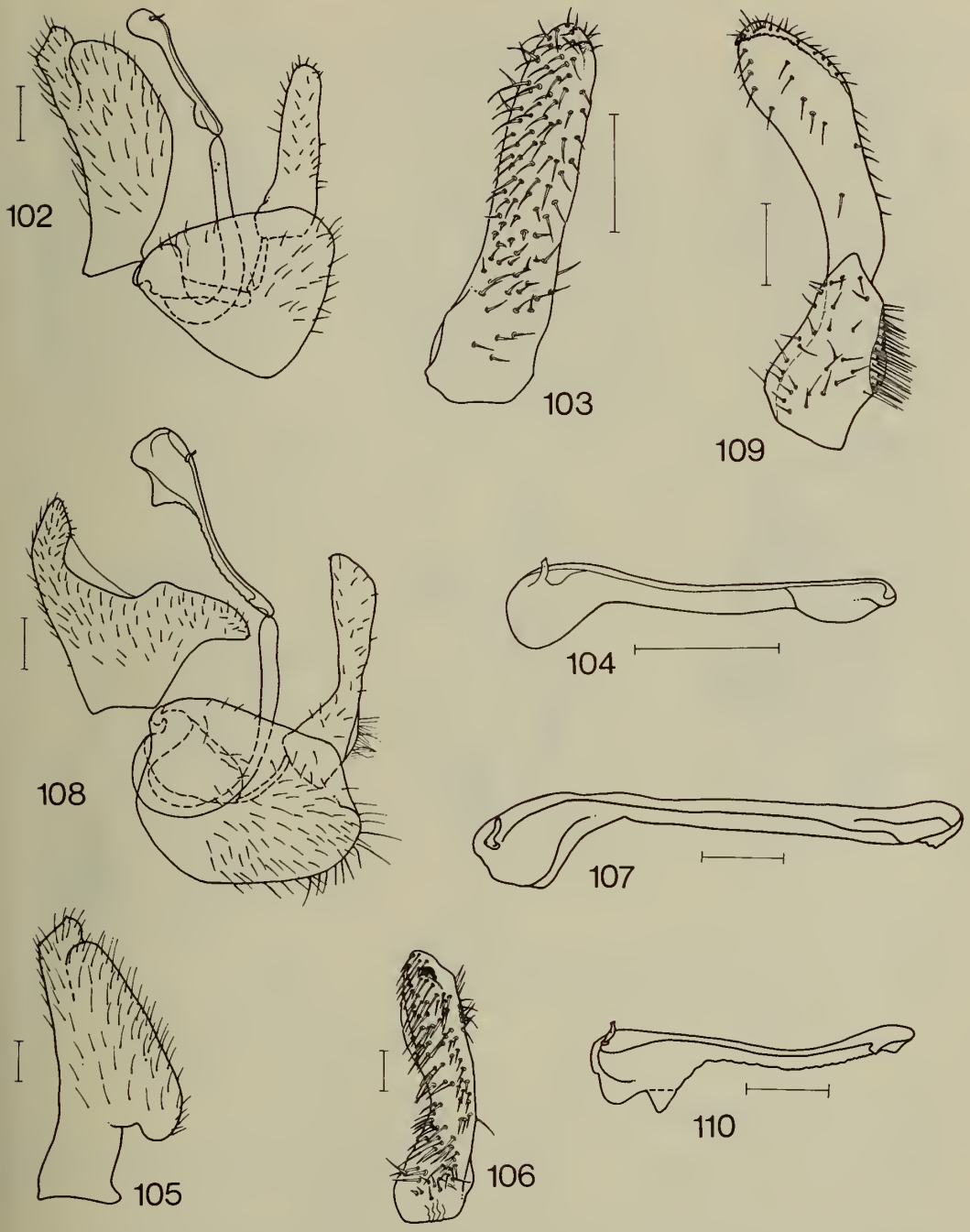
FIGS 75–82. *Ciriacremum* species, fore wings. 75, *C. julbernardioides*; 76, *C. orientale*; 77, *C. africanum*; 78, *C. megafricanum*; 79, *C. vondraceki*; 80, *C. jilorense*; 81, *C. capense*; 82, *C. funestum*. Scale line represents 1·0 mm.



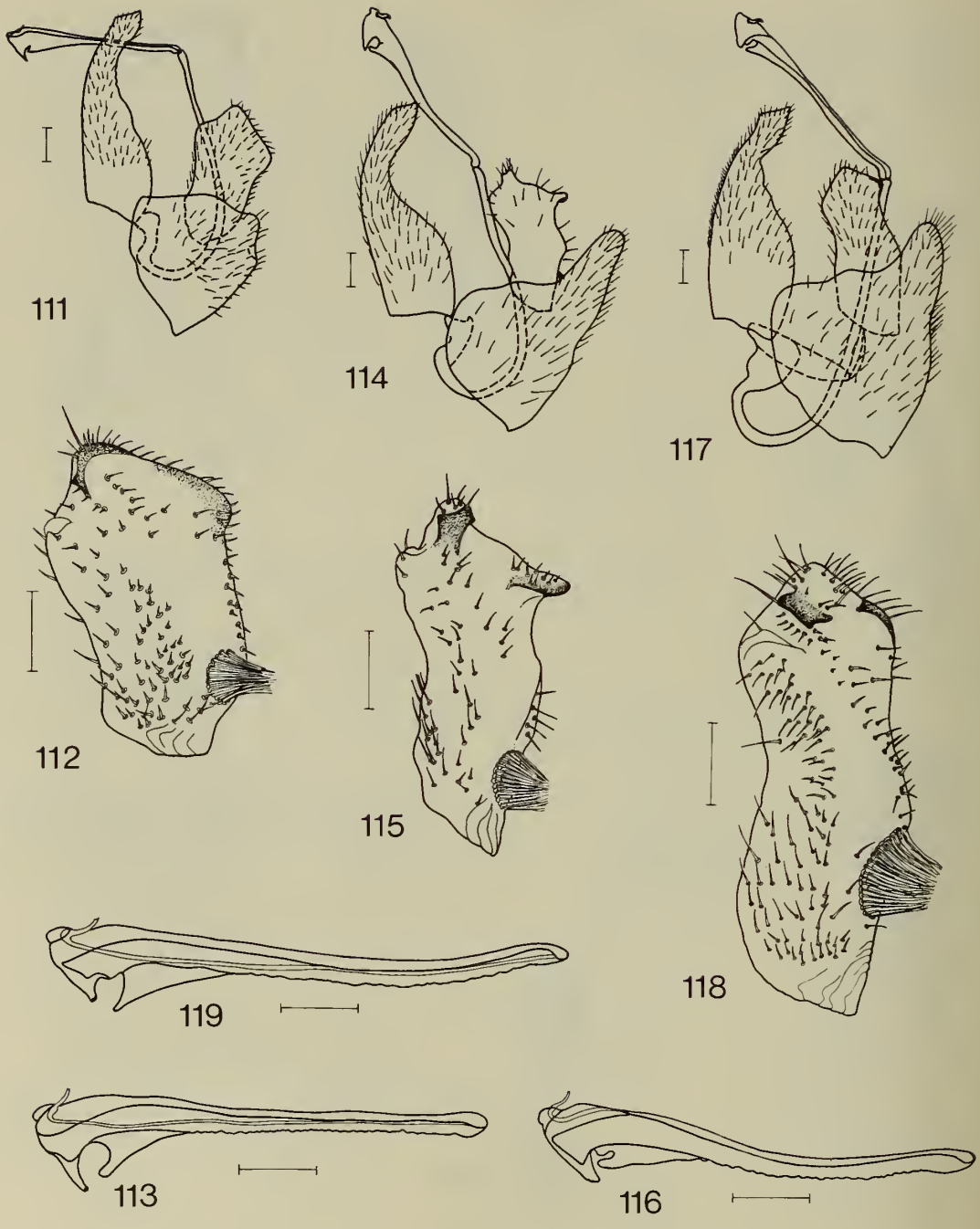
FIGS 83–92. Ciriacremini species, costal margin of hind wing. 83, *Kleiniella superba*; 84, *K. oblongata*; 85, *K. guineensis*; 86, *K. jassina*; 87, *K. congoensis*; 88, *K. medleri*; 89, *Palmapenna hymenostegioides*; 90, *Ciriacremum filiverpatum*; 91, *C. angolense*; 92, *C. funestum*. Scale line represents 0·1 mm.



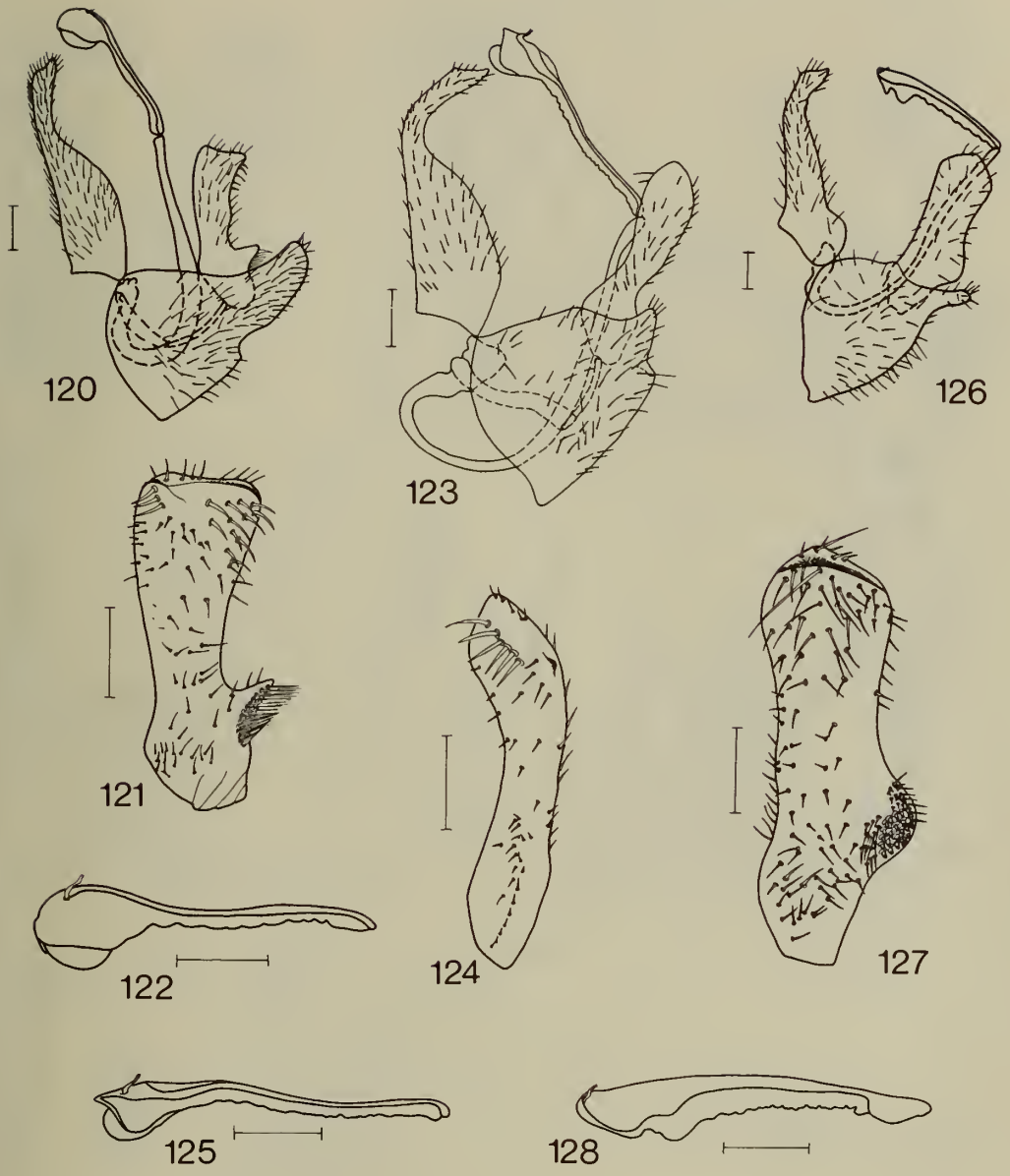
FIGS 93–101. Ciriacremini species, male genitalia. *Palmapenna hymenostegioides*, 93, entire genitalia, lateral view; 94, paramere, inner surface; 95, distal segment of aedeagus. *Kleiniella jassina*, 96, entire genitalia, lateral view; 97, paramere, inner surface; 98, distal segment of aedeagus. *K. congoensis*, 99, entire genitalia, lateral view; 100, paramere, inner surface; 101, distal segment of aedeagus. Scale line represents 0·1 mm.



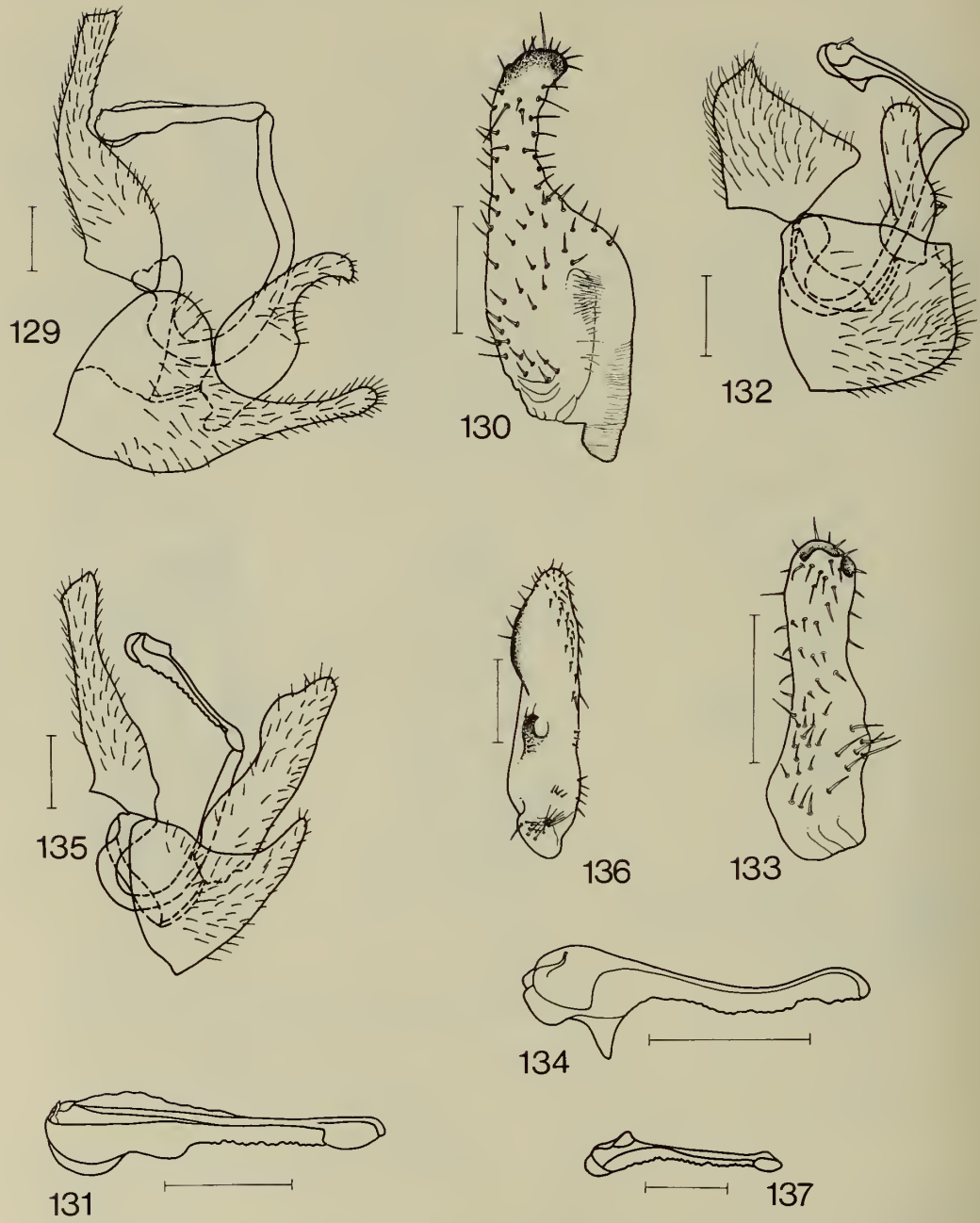
FIGS 102–110. *Kleiniella* species, male genitalia. *K. guineensis*, 102, entire genitalia, lateral view; 103, paramere, inner surface; 104, distal segment of aedeagus. *K. oblongata*, 105, proctiger, lateral view; 106, paramere, inner surface; 107, distal segment of aedeagus. *K. medleri*, 108, entire genitalia, lateral view; 109, paramere, inner surface; 110, distal segment of aedeagus. Scale line represents 0·1 mm.



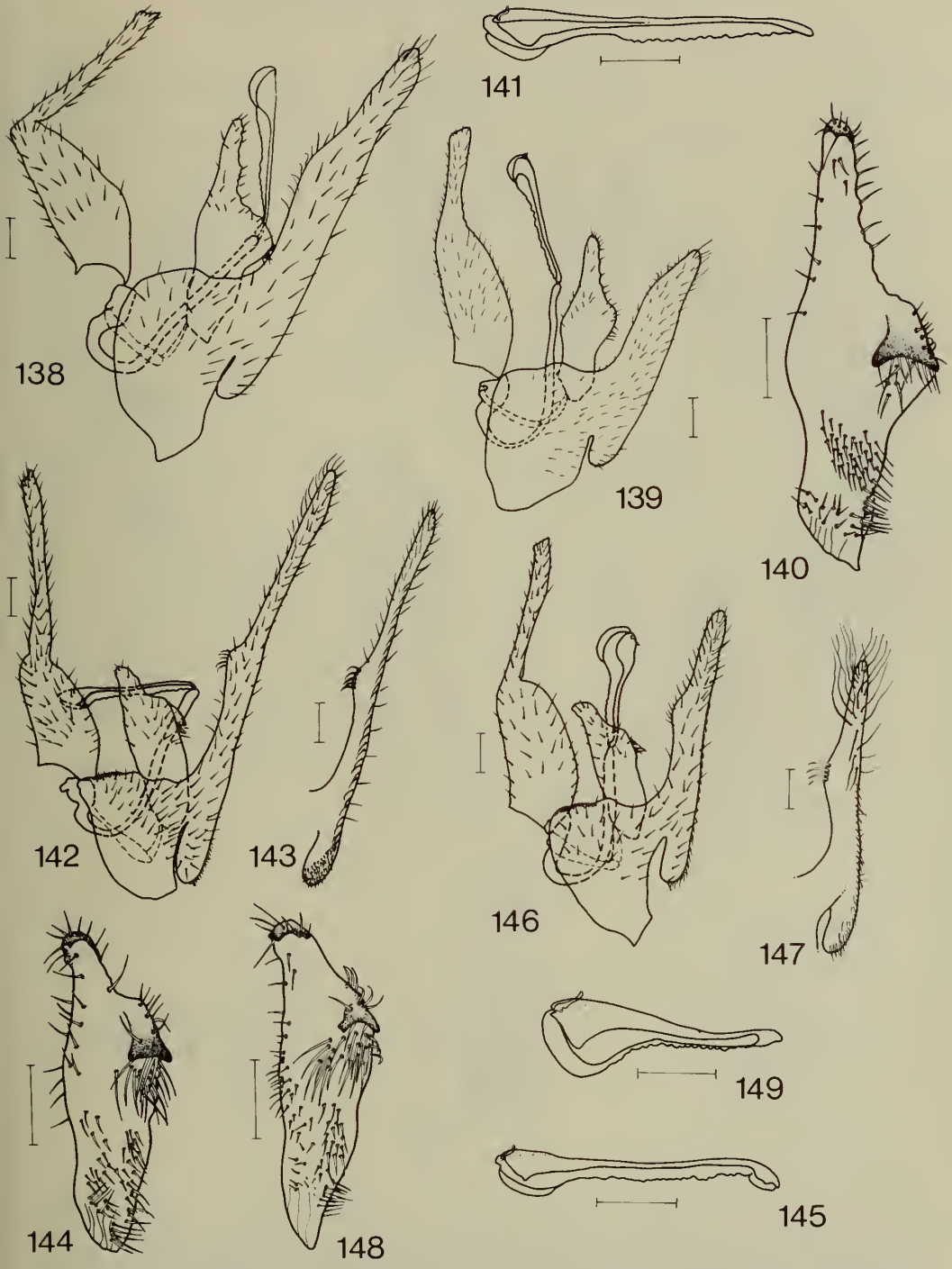
FIGS 111–119. *Ciriacremum* species, male genitalia. *C. filiverpatum*, 111, entire genitalia, lateral view; 112, paramere, inner surface; 113, distal segment of aedeagus. *C. pervatum*, 114, entire genitalia, lateral view; 115, paramere, inner surface; 116, distal segment of aedeagus. *C. relatum*, 117, entire genitalia, lateral view; 118, paramere, inner surface; 119, distal segment of aedeagus. Scale line represents 0·1 mm.



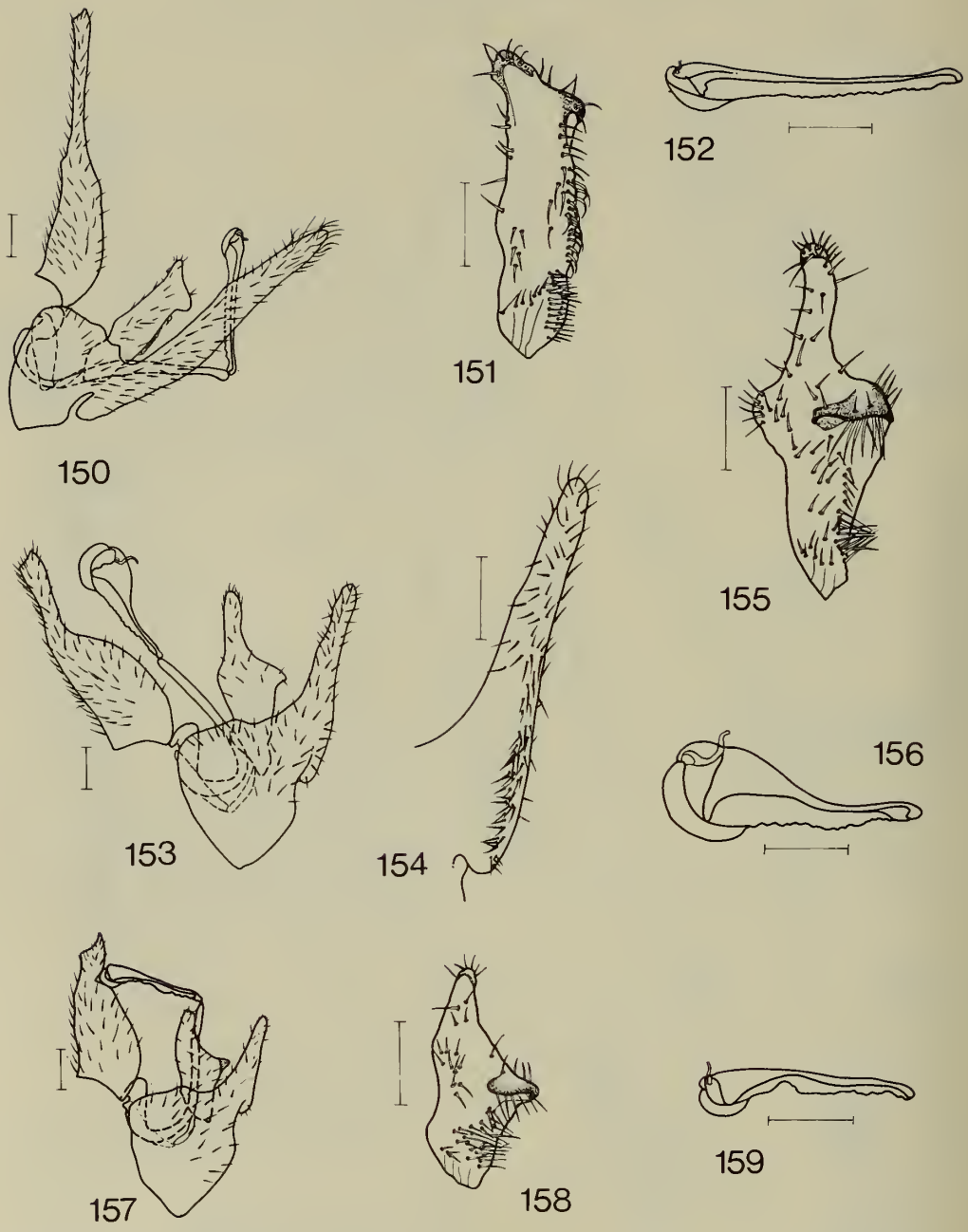
FIGS 120–128. *Ciriacremum* species, male genitalia. *C. nigripes*, 120, entire genitalia, lateral view; 121, paramere, inner surface; 122, distal segment of aedeagus. *C. nigeriense*, 123, entire genitalia, lateral view; 124, paramere, inner surface; 125, distal segment of aedeagus. *C. angolense*, 126, entire genitalia, lateral view; 127, paramere, inner surface; 128, distal segment of aedeagus. Scale line represents 0·1 mm.



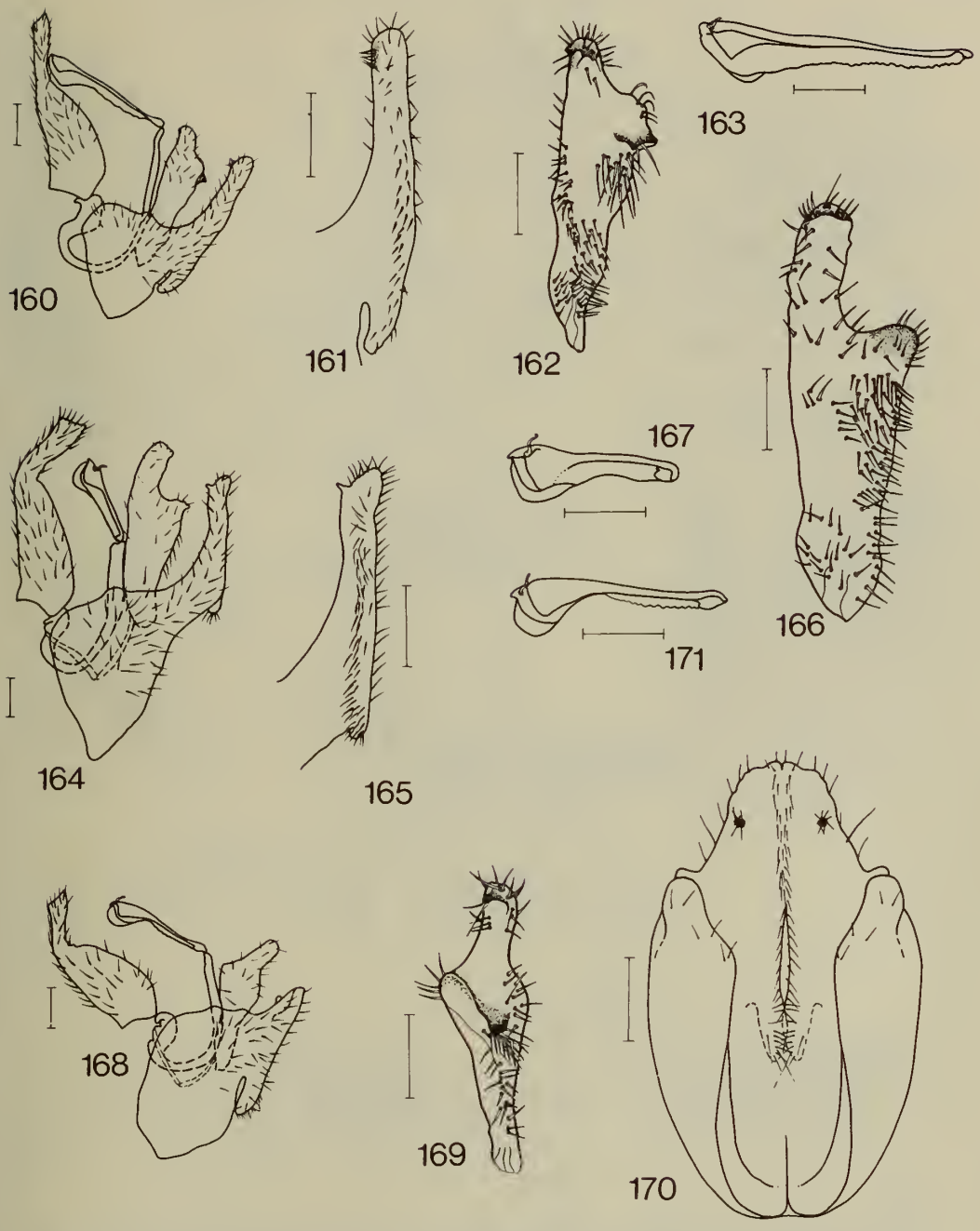
FIGS 129–137. *Ciriacremum* species, male genitalia. *C. funestum*, 129, entire genitalia, lateral view; 130, paramere, inner surface; 131, distal segment of aedeagus. *C. capense*, 132, entire genitalia, lateral view; 133, paramere, inner surface; 134, distal segment of aedeagus. *C. jilorense*, 135, entire genitalia, lateral view; 136, paramere, inner surface; 137, distal segment of aedeagus. Scale line represents 0·1 mm.



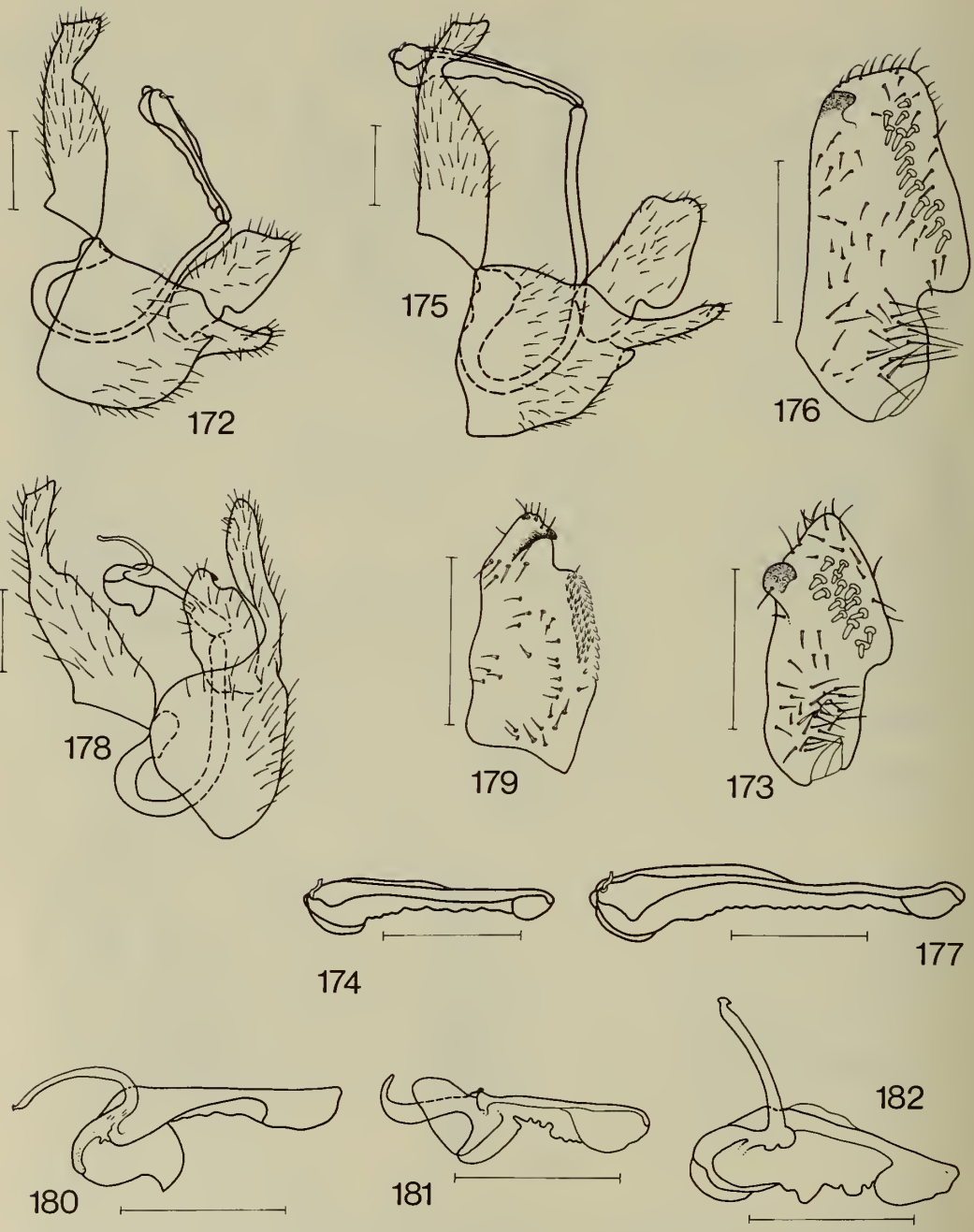
FIGS 138–149. *Ciriacremum* species, male genitalia. *C. bicaudatum*, 138, entire genitalia, lateral view, specimen from Angola; 139, same, specimen from Nigeria; 140, paramere, inner surface; 141, distal segment of aedeagus. *C. daubicatum*, 142, entire genitalia, lateral view; 143, hypovalve, inner surface; 144, paramere, inner surface; 145, distal segment of aedeagus. *C. cabudiatum*, 146, entire genitalia, lateral view; 147, hypovalve, inner surface; 148, paramere, inner surface; 149, distal segment of aedeagus. Scale line represents 0·1 mm.



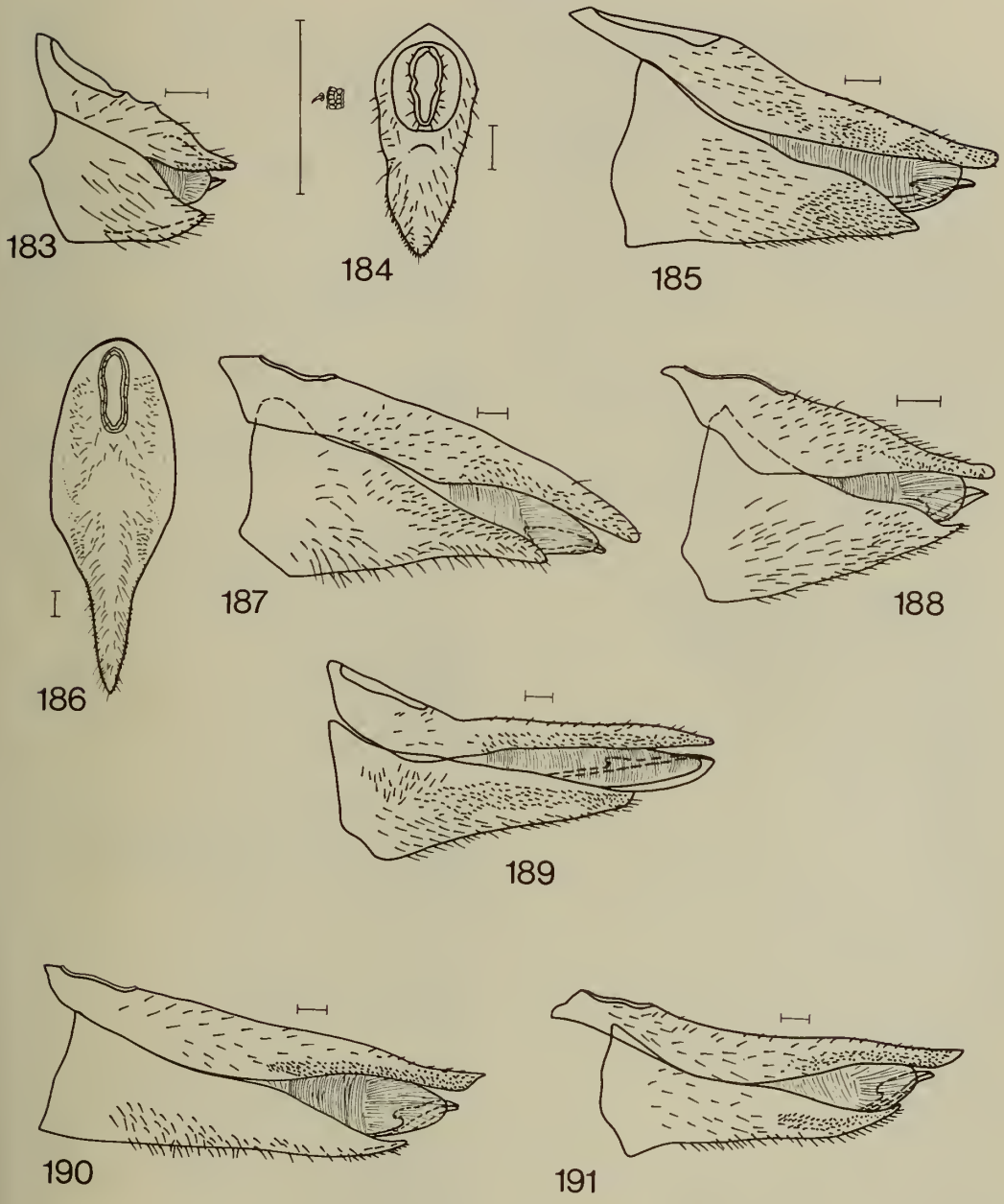
FIGS 150–159. *Ciriacremum* species, male genitalia. *C. tubacadium*, 150, entire genitalia, lateral view; 151, paramere, inner surface; 152, distal segment of aedeagus. *C. julbernardioides*, 153, entire genitalia, lateral view; 154, hypovalve, inner surface; 155, paramere, inner surface; 156, distal segment of aedeagus *C. orientale*, 157, entire genitalia, lateral view; 158, paramere, inner surface; 159, distal segment of aedeagus. Scale line represents 0·1 mm.



FIGS 160–171. *Ciriacremum* species, male genitalia. *C. carvalhoi*, 160, entire genitalia, lateral view; 161, hypovalve, inner surface; 162, paramere, inner surface; 163, distal segment of aedeagus. *C. harteni*, 164, entire genitalia, lateral view; 165, hypovalve, inner surface; 166, paramere, inner surface; 167, distal segment of aedeagus. *C. capeneri*, 168, entire genitalia, lateral view; 169, paramere, inner surface; 170, subgenital plate, anterior view; 171, distal segment of aedeagus. Scale line represents 0·1 mm.



FIGS 172–182. *Ciriacremum* species, male genitalia. *C. africanum*, 172, entire genitalia, lateral view; 173, paramere, inner surface; 174, distal segment of aedeagus. *C. megafricanum*, 175, entire genitalia, lateral view; 176, paramere, inner surface; 177, distal segment of aedeagus. *C. vondraceki*, 178, entire genitalia, lateral view; 179, paramere, inner surface; 180, distal segment of aedeagus. *C.* species 1 near *vondraceki*, from Angola, 181, distal segment of aedeagus. *C.* species 2 near *vondraceki*, from Nigeria, 182, distal segment of aedeagus. Scale line represents 0·1 mm.



FIGS 183–191. *Ciriacremini* species, female genitalia. *Palmapenna hymenostegioides*, 183, ovipositor, lateral view; 184, proctiger, dorsal view, with detail of anal margin. *Kleiniella superba*, 185, ovipositor, lateral view. *K. medleri*, 186, proctiger, dorsal view. *K. jassina*, 187, ovipositor, lateral view. *K. congoensis*, 188, ovipositor, lateral view. *Ciriacremum nigeriense*, 189, ovipositor, lateral view. *C. filiverpatum*, 190, ovipositor, lateral view. *C. bicaudatum*, 191, ovipositor, lateral view. Scale line represents 0·1 mm.

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Synonyms are in *italics*; page references to descriptions are in **bold**.

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